
United States
Circuit Court of Appeals
For the Ninth Circuit

Transcript of Record

GEORGE J. HENRY, Jr.,
Complainant.

vs.

CITY OF LOS ANGELES,
Defendant.

VOLUME 4
(Pages 1201 to 1600 Inclusive)

Upon Appeal from the United States District Court for
the Southern District of California,
Southern Division

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F. B. M. CO.

inarily would not be or could not be adjusted in the shape in which the machinery is constructed, but would necessarily be adjusted when the machinery was in place.

Q. 609. Such adjustment, if it were carried out, would most naturally be by adjusting the ropes 51 52, would it not?

A. As far as field adjustments are concerned, that is the most feasible manner for making such adjustment.

Q. 610. And the Lyndon patent disclosure in the drawing figure 5 shows well-known adjusting devices included within the length of each of these ropes 51 and 52?

A. There is plainly shown in figure 5 what are known as turnbuckles on both ropes 51 and 52, but the range of adjustment shown there is such that only slight adjustment is possible. Had he had in mind adjustment to any extent, he certainly would have provided more capable means for making such adjustment.

Q. 611. The ropes 51 and 52 are clearly shown in the drawing to unite in passing about the wheel 54 of the clutch device shown in figure 5? Is that not correct?

A. Ropes 51 52 do not unite at any point.

Q. 612. They both are connected with or are rove about the wheel 54, are they not?

A. They are both placed on and secured to the sheave 54.

Q. 613. Then lossening one turnbuckle and tightening the other turnbuckle in the two rope ends 51 and 52, would adjust the whole system, would it not, and adjust

the by-pass through its stem 49, and leave the whole system in working taut condition?

A. That is perfectly true within the limit shown as possible.

Q. 614. And under those limits considered, would simply contemplate questions of degree, would they not?

A. Not at all. The mechanism positively precludes certain limits.

Q. 615. I suppose to substitute other turnbuckles in lieu of those shown in the drawing, having greater adjustment, would involve invention?

A. I am not referring to any such line of substitution, but to the construction of this part of the mechanism as a whole.

Q. 616. There is nothing in this mechanism and as shown in figure 5 particularly, to prevent any degree of adjustment of the by-pass which you wish to effect by the substitution of turnbuckles of the capacity required?

A. There is nothing shown to prevent such substitution as far as figure 5 is concerned. Other parts would limit such substitution.

Q. 617. What are those other parts?

A. Those parts are specially the circuit 105 carrying the energizing current to the solenoid or electromagnet 64, and containing a cut-out device 74 75. Such device, inasmuch as it necessitates positively a return movement on the part of the by-pass valve from the limit, would preclude the adjustment discussed within such bounds.

Q. 618. That cut-out device which you refer to would operate just the same when the pins 73 actuated it, irrespective of what the usual or normal or preferred position of the by-pass 48 was. Is that not correct?

A. The cut-out 74 75 would cause this part of the mechanism to be absolutely inoperative, should the normal position of the by-pass valve 48 be varied beyond certain limits fixed by the construction of the parts connected to the said cut-out.

Q. 619. In other words, you would be confronted by the appalling problem of shifting the pin 73 so that the proper step relation would exist between the by-pass movement and cut-out operation? Is that not correct?

A. It has nothing to do with such a minor change. It is a fundamental change, inasmuch as it would require other methods of stopping the movement of the by-pass valve when it has reached its limits.

Q. 620. Could not that same cut-out device be operated at any phase of by-pass operation decided upon by simply shifting those pins 73?

A. It could not.

Q. 621. Why not?

A. For the very simple and evident reason that when the contact is once opened the system is inoperative without a return movement on the part of the by-pass valve in order to reconnect this contact so that the device may be operative on further governing movement.

Q. 622. And by changing the position of pins you simply limit or fix the limit point at which the movement of the by-pass is to cease. Is that not correct?

A. The point at which the movement of the by-pass valve is to cease is a question of relationship of the rope lengths, the nature of the attachment to the sheave 54, the location of the pins, except as previously testified on several occasions that inasmuch as this connected device re-

quires a return movement to be again reconnected, such limits could not be extended beyond a certain point.

Q. 623. As to that I agree with you perfectly, and it is a question, is it not, of therefore relating the parts you have referred to so that you would keep within the extreme of adjustment?

A. By departing from the plain declaration of the specifications, the by-pass valve can be shifted somewhat from the half position. To what extent will depend entirely upon the correlation of the movements.

Q. 624. And it would not mean to you a troublesome engineering problem, would it, to provide turnbuckles in the ropes 51 and 52 of the capacity required under the circumstances, and to shift the point of attachment of the ropes 51 and 52 on sheave 54 as shown in figure 5, and to shift the pin 73, or to do any of these things?

A. To make these changes would not be a particularly serious thing. But the success attending such changes would necessarily depend upon the extent of such changes and the effect on the mechanism shown.

Q. 625. Now, as to the differentiation between the inertia effects produced in the pipe-line in connection respectively with moving the gate into closing direction and into opening direction, could you conceive of a clearer differentiation between these two distinct and separate inertia effects or conditions than that set forth in the Lyndon specifications, beginning at line 51 on page 4 and being as follows: "As is well known, if a water-wheel gate be suddenly opened to increase the speed of the wheel, the first effect will be to actually decrease the speed of the wheel, for the reason that the velocity of the water through the gate drops, because a larger area for

the water to pass through is provided, and a larger volume of water is not immediately provided, because there is a time element required, which time element is the length of time required for gravity to accelerate the entire volume of water contained in the feed pipe, which cannot be accomplished instantaneously. If the water-wheel gate be closed a reverse effect will be noticed—that is, instead of decreasing the speed of the wheel the speed will actually rise, owing to increased velocity, through the water-wheel gate, due to a decreased area of opening, while the volume of water remains for the time constant, the volume decreasing only after a short time has elapsed which length of time is required to arrest the column of water in the feed pipe.”

Is there any doubt left in your mind after reading this that Lyndon clearly differentiates in his specification between these two separate and distinct inertia effects respectively accompanying gate opening and gate closing, or movements of the gate in opening and closing directions.

A. The quotation contained in the question indicates with perfect clearness that Mr. Lyndon knew that certain effects occurred on closing movement, and an opening movement of the main water-wheel gates. He therefore clearly expresses a knowledge that these conditions exist but he makes no differentiation as to the degree in the effect of these conditions on the governing of the water-wheel.

Q. 626. Could you not, as an engineer, taking into consideration this language of the Lyndon specifications, determine how the conditions in a given case fitted either one side or the other of this inertia question?

A. If I were called on to determine the condition which would follow an opening or closing movement of the water-wheel gate, I would be compelled to disregard Mr. Lyndon's statement as being inaccurate, as not containing correct information as to what actually happens in the pipe supplying water to the water wheel.

Q. 627. You take issue, do you, with the statement he makes as to these inertia effects which respectively accompany gate closing and gate opening?

A. I take direct issue with his statement, especially with that part wherein he states: "If the water-wheel gate be suddenly opened * * * a larger volume of water is not immediately provided." This statement is not true, and cannot be true under such opening conditions of the main water-wheel gate.

Q. 628. If the gate were suddenly opened, do you mean to say that a proportionately larger volume of water would be instantaneously provided?

A. I have made no statement as to the proportionally larger quantity, but simply that there will be a larger quantity supplied immediately.

Q. 629. Will there be a larger volume of water instantaneously provided to the same extent that the volume will be larger after gravity has had time to affect the flow of water in the pipe?

A. The application of the word "gravity" in this case is extremely indefinite. As I have clearly testified in my direct examination, when a water-wheel gate is opened there can be no question but what the pressure on the pipe immediately behind the gate will be dropped, according to well-known laws. The only possible way of explaining such pressure drop is that the flow of water

in the pipe at the point to which the gauge is attached is increased. If there were no change in this velocity at that point there would be no pressure change. If the pressure at the gauge shows a lowered pressure, it follows necessarily that there is an increase in velocity at that point.

Q. 630. And this increased velocity is not immediately what it must be to supply the proper flow of water called for by the wheel upon the opening of the gate? Is that not correct?

A. Under ordinary operating conditions this increased flow will not be that amount desired by the wheel, but it will be directly in proportion to the fall in pressure which has taken place.

Q. 631. And after the new governing condition has become established, the flow will be greater than during governor operation, will it not?

A. It will be provided this fall in pressure is permitted to exist long enough to accelerate the water in the pipe.

Q. 632. Now, with those constructive considerations of the language quoted, you have no hesitation in saying that Lyndon clearly points a distinction between the two inertia effects in the pipe-line, have you?

A. He clearly states that they both exist. He does not differentiate as to the extent or effect.

May 7, 1914. P. M.

Q. 633. On May 14, 1892, you applied for United States letters patent for a water-wheel, did you not?

A. I have forgotten the date, but I did apply for a patent somewhere about that time.

*Dr. Berry recalled
cross examination
resumed by Mr. Blakeslee*

Q. 634. That patent was issued to you March 14, 1893, No. 493239, was it not?

Mr. Westall: The question is objected to as not proper cross-examination. If counsel wishes to make the witness his own he can call him.

A. I have forgotten the details, but upon reference to the patent just produced I would say that was the one.

Mr. Blakeslee: The purpose of this part of the cross-examination will be very manifest as it develops.

Mr. Westall: Whether manifest or not does not obviate the objection that it is not proper cross-examination.

Mr. Blakeslee: That is for the court to decide.

Q. 635. You have applied for other letters patent of the United States, have you not?

A. I have applied for a number of patents.

Q. 636. United States letters patent No. 1002960 were issued to you for a nozzle under date September 12, 1911, were they not?

A. Examining the patent just produced by you I recognize it as such a patent.

Q. 637. The invention of this nozzle patented related in certain of its aspects to a packing device, did it not?

A. It included such a device.

Q. 638. Between the years 1892 and 1911 you applied for other letters patent of the United States, did you not, and I am not now trying to pry into matters which are properly to be held within your rights as an inventor, nor trying to pry into any pending applications which you may have and which you made during those years, that is, as to the nature of the inventions. But I simply wish

to know if you applied for any other letters patent during the years mentioned.

Mr. Westall: The further objection is noted that the evidence called for is immaterial and incompetent.

A. I applied for other patents during that time.

Q. 639. During those years you have kept particularly in touch with the matters concerning water-wheels and the parts and features thereof, have you not?

A. I have kept posted in a general way as to that line of business.

Mr. Westall: The further objection is made that this line of questions is entirely without the issues of the present case. The Lyndon patent discloses no water-wheel nor does it describe a water-wheel. The construction of any water-wheel is entirely immaterial, or problems as to any such water-wheel.

Q. 640. By Mr. Blakeslee: And I believe that you have testified that in the years 1895, 1896 and 1897 you were aware of the inertia effects in pipe-lines of power plants which we have discussed, and the objectionable and dangerous nature thereof. Is that not correct?

A. I was certainly aware of inertia effects in pipe-lines and of the dangerous effects when excessive.

Q. 641. And as I understand it, in the apparatus which you have testified you designed for installation at the plant of the Power Development Company, as reflected by the showing of Defendant's Exhibit Berry Blue print No. 1, you were aiming to some extent to eliminate the dangerous and objectionable effects of such inertia conditions and protect the power house and pipeline in that manner and in those respects, and in general to secure better governing of the water-wheel? Is that

a correct summary of what your objects were, in part, at least?

A. A correct statement would be that the by-passing device there installed was for the distinct and particular purpose of enabling rapid action on the part of the governor to maintain approximately constant speed of the wheel. It included care for the inertia effects, both on opening and closing the water-wheel gates, which necessarily in the device then installed included the prevention of excessive pressure rises or falls.

Q. 642. Now, as you have testified, you designed this installation as reflected in Defendant's Exhibit Berry Blueprint No. 1 and, as far as you know, you were the originator of such design and of the general combination of features, including the by-pass, provided for therein, and testified further that you had the above mentioned objects in view in designing this installation. I will ask you to state as an engineer conversant with hydraulic matters and water-wheels and water-wheel gates, what, in your opinion, was the relative value in the art of water-wheels and water-wheel governing, in comparing such Power Development Company installation with the subject of your letters patent of the United States 1002960 and the subject of your letters patent of the United States, No. 493239?

A. The question is of such a vague and indefinite nature that I fail to see any comparison between the devices installed at Bakersfield and those shown in the two patents mentioned.

Q. 643. Well, let us bring it down to a money basis. Suppose you had obtained the United States patent for a combination of features disclosed in Defendant's Exhibit

Berry Blueprint No. 1, and the patent office had issued you letters patent thereon, and that you were considering the sale of such letters patent and the sale of the other two letters patent identified as having been issued to you, how would you grade these three patents as to the relative value?

A. I see absolutely no basis for making any comparison between the two patents issued and the subsequent patents. The value of a patent depends mainly upon the view of purchasers.

Q. 644. Have you ever done anything commercially with the subjects of the two issued letters patent above mentioned, which you received?

A. Patent No. 493239 was sold by me. In regard to the other patent, I have taken no commercial steps, that is, no successful commercial steps to do anything with it.

Q. 645. When did you sell that letters patent?

A. I have forgotten the date at present.

Q. 646. Was it before you designed, as testified, the Power Development Company's plant installation?

A. I think it was before. Probably so.

Q. 647. Was the purchase price received for that patent made a matter of public record?

A. Not to my knowledge.

Q. 648. I will ask you, if you wish to so state, what the purchase price paid you for that patent was. You can refuse, if you wish to. I am not trying to pry into it. But if you want to you may state it.

A. The figures, as I remember it, were \$1200.

Q. 649. What do you consider the relative importance in the art of the subject of that sold patent and the subject of such supposititious patent as we have assumed

you might have obtained for the construction and interrelation of the device shown in Defendant's Exhibit Berry Blueprint No. 1?

A. The question is of an extremely indefinite nature, and it is hardly possible to make such a comparison.

Q. 650. Well, you have testified that the subject of this Berry Blueprint No. 1 was a production of your skill. You must be able to put some value upon it in proportion to the value which you put upon the letters patent which you sold for \$1200. Can you give us a rough comparative money figure?

Mr. Westall: Objected to as entirely speculative, and calling for the wildest kind of guesswork and as incompetent, irrelevant and immaterial, and not proper cross-examination.

A. There is nothing on which I can base any such estimate.

Q. 651. By Mr. Blakeslee: Do you think such ideas as might have been original with you, and as reflected in the subject of Berry Blueprint No. 1 at the time you say you designed the Power Development Company's plant, were worth \$1200?

A. There is no basis for making any such estimate. The device was vitally necessary to the quick operating governor installed there. Just what its money value was I couldn't say.

Q. 652. But, at any rate, you did not consider the subject of Berry Blueprint Patent No. 1 to be of sufficient value to apply for a patent for the same in the year 1896 or thereafter, did you?

A. The reason this question would not have come up at that time was the fact that in the year 1897 I entered

the employ of a company which, though building hydraulic machinery, was not so particularly interested in power house work.

Q. 653. Did your contract with them provide that all or any inventions you might make would be their property, or jointly their property and yours, or yours solely?

Mr. Westall: Objected to as not proper cross-examination, as calling for secondary evidence.

A. The question is indefinite, inasmuch as the name of the company involved is not stated.

Q. 654. By Mr. Blakeslee: Put it with the company you have just referred to.

A. I have no contract with that company.

Q. 655. Then had you produced or had you considered at that time that you had produced an invention being the subject of Berry Blueprint No. 1, you could have proceeded to apply for letters patent thereon, to be issued to yourself as sole patentee and owner, could you not?

A. I would have felt at liberty to apply for a patent had I so desired.

Q. 656. And you did not apply for any letters patent on the Berry Blueprint No. 1.

A. I made no such application for the reasons before stated.

Q. 657. Was there a further reason, namely, that the subject of this blueprint failed to produce the results or operate successfully at the Power Development Company plant to the extent and with the result that such installation was discarded within a few months by the Power Development Company mentioned?

A. The discarding of the parts which were discarded

at Bakersfield had absolutely nothing to do with that question. I have devised many things in my experience for which I have applied for no patents.

Q. 658. Did you ever design or cause to be designed or know of their having been designed after the installation of the Power Development Company's plant, which you say included the subject of the Berry Blueprint No. 1, any other power plant installation which followed the disclosure of Berry Blueprint No. 1 or substantially followed the same?

A. I do not know of any such plant. The Girard Water Wheel Company ceased to exist at this time.

Q. 659. And you yourself did not install or design or cause to be installed or designed any such succeeding installation or plant, did you?

A. I did not.

Q. 660. You continued to be aware, subsequent to the years 1896 and 1897, did you not, that these inertia effects which we have discussed as being present in power plant penstocks and pipe-lines, were causing difficulty and damage and were most desirable to be overcome and eliminated, if possible.

A. Such inertia effects did not seem to exist at that time. There were many other devices by which these effects could be taken care of, some of which would have been totally inapplicable to the Girard wheels to the same extent that this particular by-pass would not be necessarily required with other types of wheels.

Q. 661. There were many types of wheels to use such by-pass on in the governing mechanism which, if operated successfully, could have been used after the years 1896 and 1897, were there not?

A. The type of wheel in general use on this coast at that time and later was the impulse water-wheel with which there could be used and were used deflecting hoods which accomplished the purpose aimed at in this by-pass valve used at Bakersfield, and in their application to such impulse wheels were of a simpler nature than this by-pass. Such devices, however, could not have been used on Girard wheels installed at Bakersfield.

Q. 662. Well, wheels were used, and many of them subsequent to those years, on the coast and elsewhere, in connection with the governing mechanism with which such a by-pass device, if successful in operation, could have been utilized. Is that not correct? And did you not know so.

A. I did not know of any such installation.

Q. 663. When did you first know of such an installation in connection with which such by-pass could be utilized, if successful in operation, after 1897.

A. The by-pass designed and installed for use at Bakersfield is applicable to the Girard types of wheels which has been seldom used on the coast and which has generally been found to be inefficient wherever installed. I believe that all such installations of Girard wheels were manufactured in the East, and it is quite likely that the manufacturers did not know of the existence of this by-pass valve.

Q. 664. And would not such by-pass device, if successful, have been utilizable by and welcomed by the manufacturers of such wheels?

A. It undoubtedly could have been used by them had they known anything about it. It had not been made public to a very great extent.

Q. 665. Could not that by-pass device have been utilized throughout the whole period of time subsequent to 1896 and down to the present time for regulating turbine water-wheels or assisting in the regulation thereof and protecting the pipe-lines supplying such wheels?

A. It is by nature especially adaptable to the Girard type of wheel. Whether it could or could not have been extended, I am unable to say at present.

Q. 666. Don't you know that at the present time a by-pass device is used in connection with the regulation of turbine water-wheels in this country?

A. I do not recall at the present time that this particular form of by-pass valve is in use. But there is no doubt that by-pass valves performing this function are in use.

Q. 667. You know, do you not, that a by-pass device successfully used today in connection with the regulation of turbine water-wheels and for protection of pipe-lines leading thereto, is in existence?

A. I am aware that safety relief valves are used for the protection of pipe-lines.

Q. 668. Are not those safety-relief valves used to prevent dangerous inertia effects in the pipe-line in accordance with the objects, at least in part set forth in the Lyndon patent in suit?

A. They are used expressly to protect the pipe-line from excessive pressure rises and possible destruction.

Q. 669. And an example of the same is found in Complainant's Exhibits E to L, is it not?

A. That is the object of the defendant's device shown in Complainant's Exhibits mentioned.

Q. 670. What has been the nature of your employ-

ment or your engineering connections since the year 1896?

A. My employment, starting from 1897, has been as draughtsman, chief draughtsman and chief engineer of a concern manufacturing mining machinery, water-wheels, giants, gravel elevators and related machinery.

Q. 671. With what concerns have you been connected in such capacity?

A. With the Joshua Hendy Iron Works up to about two years ago.

Q. 672. When did you first connect yourself with this concern?

A. In the year 1897.

Q. 673. That company was much interested that year in water-wheels and general hydraulic machinery, was it not?

A. Along different lines than those used in power houses. They had not, to my knowledge, manufactured any such machinery.

Q. 674. Have they not had a line of water-wheels as part of their manufacturing interests?

A. They have manufactured water-wheels quite extensively for mining work. These, however, were as a rule small and did not involve the governing conditions which are found in power houses.

Q. 675. Nevertheless, governors were used on the wheels of such mining installations?

A. In very few cases.

Q. 676. When did the Joshua Hendy Iron Works commence to manufacture water-wheels for any purpose, if you know?

A. I cannot say.

Q. 677. Were they manufacturing them in 1897?

A. They were manufacturing them before that time.

Q. 678. I show you Defendant's Exhibit Cobb Pressure Regulating device Circular, and call your attention particularly to the cut of the device therein, and ask you if you know what this cut depicts.

A. The cut in Defendant's Exhibit Cobb Pressure Regulating Device Circular shows what I recognize to be a device gotten up by Mr. Cobb for use on pipe-lines and intended to decrease pressure rises or prevent pressure rises to a greater or less extent.

Q. 679. Did you ever see any such devices in use?

A. I have. *A.*

Q. 680. How many? *A.* I have seen two in actual operation and one which probably was in operation before the plant was destroyed by fire.

Q. 681. Where were these and when?

A. One of these operating devices was on the plant at Bakersfield where I was in the year 1897, and the other, to the best of my knowledge, is still in use at the North Star mine near Grass Valley where I saw it less than a year and a half ago. The one which is out of use was at the old Blue Lakes plant, near Jackson.

Q. 682. Do you know who made those Cobb devices?

A. I cannot say.

Q. 683. Did you ever see any of them at the works or property of the Joshua Hendy Iron Works?

A. I do not remember having seen them there.

Q. 684. Did you ever know of their making one?

A. I do not.

Q. 685. Did you know that they purchased from Mr.

Cobb the letters patent purported to cover this device?

A. I understood that they had done so.

Q. 686. The Joshua Hendy Iron Works own or control a number of letters patent for water-wheels and water-wheel adjuncts and pipe-line devices, and similar apparatus, do they not?

A. So far as I recall at present this is the only one which could be applied to power house work or water-wheel work in particular.

Q. 687. You do not know fully just what letters patent they own or control?

A. I have no means of knowing just what letters patent they own.

Q. 686. The object of this Cobb pressure regulating device was to nullify inertia effects in pipe-lines, was it not?

A. The object of such a device on a pipe-line would be to decrease such effects should they occur. They would be installed as a safety provision, just as in all well designed plants additional and auxiliary safety devices are still provided.

Q. 689. You do not find any showing of any such pressure regulating device in any of the photographs, being Complainant's Exhibits E to P, do you, and that includes those four small photographs.

A. I do not find any such device in Complainant's Exhibits E to P.

Q. 690. Have you seen any pipe-line and power house or power line installation, or do you know of any of your own knowledge, in connection with which such pressure regulating devices were installed subsequent to the year 1900?

A. I do not recall any plant where this device was installed subsequent to the year 1900.

Q. 691. This Cobb pressure regulating device is not shown anywhere in Berry Blueprint No. 1, is it?

A. The Cobb pressure regulating device is not shown in Berry Blueprint No. 1 .

Q. 692. Do you know where it was installed, at the Power Development Company installation?

A. As I remember it was mounted on the reservoir outside of the power house.

Q. 693. What kind of a reservoir was that?

A. A reservoir in the sense that it was an enlargement of the main line from which the branch lines were taken away.

Q. 694. I show you two photographs, being Complainant's Exhibits Exterior of Power Development Company plant, and Power Development Company plant during construction, and ask you if you can state what these photographs, in the main, show.

A. These photographs represent the plant of the Power Development Company on the Kern River.

Q. 695. The plant you have heretofore testified about as including an installation in substantial accordance with Berry Blueprint No. 1?

A. That is the plant referred to.

Q. 696. Can you show me where the Cobb pressure regulating device is in these photographs which you have testified as being part of that installation, and mounted upon the reservoir on the pipe-line?

A. In Complainant's Exhibit Power Development Company's plant during construction, the Cobb relief

mechanism is shown on the right of the photograph; while in the other it appears to be in the center.

Q. 697. Will you please draw an ink line to this Cobb pressure regulating device in each of these photographs from the device to the plain margin of each exhibit, and put your name at the end of such leading line, for identification of the marking?

Mr. Westall: I do not understand that the witness has testified that the air chamber referred to was a Cobb pressure regulating device. In order that there may be no misunderstanding, I should like to have the record made clear on that.

Mr. Blakeslee: The witness has definitely testified as to this, and we do not care to have his testimony interrupted by any such queries. Read the last question.

(The question is read.)

A. I now draw a line from the cylinder at the end of said line, which represents the installation of the Cobb pressure regulating device, and will explain that this device, by reason of its construction, is not an operating device unless there is a pressure rise in the pipe-line, and inasmuch as the cooperation of the by-pass valve of the main water-wheel gates prevented such pressure rises that during the operation of that device this portion of the plant did not serve any useful purpose. In such a case it would be an additional safety device such as is incorporated in the design of all well designed plants, even to this day.

Q. 698. By Mr. Blakeslee: And yet you do not know of any such Cobb pressure regulating device having been installed in connection with any plant since the year 1900,

and note that I have said "Cobb pressure regulating device" in this question.

A. I do not know of the installation of this device in any plant since the year 1900.

Q. 699. Are you acquainted with any of the installations made within the last few years by the Pelton Water Wheel Company of San Francisco?

A. Not acquainted in any definite manner.

Q. 700. Have you seen any of them?

A. It depends upon how many years are covered by the question.

Q. 701. Well, let us make it ten years.

A. I have seen a number of such plants.

Q. 702. On which of them, if any, was there any pressure regulating device upon the pipe-line, and installed within that period of time?

A. I cannot specify particularly in this respect, but I would expect to find safety devices on most of them.

Q. 703. Do you know of any such pressure regulating devices being on any such installations?

A. Air chambers used for this purpose have been quite common. I could not for the moment point to any particular installation. It had been one of the standard devices put in for the purpose of protecting the line from excessive pressure rise.

Q. 704. You are familiar, as a matter of fact, are you not, with the nature of the installations of a good many Power Development Company plants hydraulic in nature or electro-hydraulic, or either, which have been installed in the last ten years?

A. I am acquainted with the nature in a general way of such plants.

Q. 705. Can you mention any such plants which you have seen during the last five years?

A. Within the last five years I have visited the plant at Centerville, the De Sabla plant, the Colgate plant, the Deer Creek near Nevada City, the Electra plant near Jackson, and the plant on the American River near Placerville.

Q. 706. These are among the largest and most important hydro-electric plants on the Pacific Coast, are they not?

A. Some of them are large and some are small.

Q. 707. Has any one of them to your knowledge an air chamber upon the pipe-line?

A. I do not recall that any of these plants are provided with an air chamber on the pipe-line. I would not expect to find them in the more modern plants, as there has been a tendency to move away from this device in the direction of others on account of certain inherent drawbacks which developed in their use, especially under higher heads.

Q. 708. Did you in that Power Development Company plant, in 1896, have any occasion to study the flow of water in the flume near the plant as to the presence therein of any foreign objects or floating objects, such as sticks, blocks of wood, branches, or the like, or any other objects or substances that might make trouble in the operation of the plant?

A. I did not make any particular investigation in this direction.

Q. 709. There is hardly a tree in sight from that plant, is there?

A. I see no trees in the photographs last referred to.

Q. 710. You would call it a particularly barren, treeless, unwooded and desolate country, devoid of flora of any kind?

A. It was devoid of flora in the immediate vicinity of the plant, but the upper reaches of this river are very well wooded.

Q. 711. There was the usual means provided in the flume to divert from the penstock any floating objectionable objects or substances, were there not, at the entrance of the flume?

A. As far as I remember, they provided some such protection. Just what they had I am unable to say at present.

Q. 712. And you have testified, I believe, that there was a screen or grizzley of approximately 1-inch mesh at the junction of the flume and the penstock. That is your recollection, isn't it?

A. Not in a definite manner. I presumed at that time, as I do now, that they had such appliances.

Mr. Blakeslee: We will take a recess while I sit down for two minutes.

Mr. Blakeslee: We offer in evidence copy of the United States patent issued to the witness March 14, 1893, 493239, as Complainant's Exhibit Berry Patent No. 493239.

Similarly, we offer in evidence copy of United States patent No. 1002960, issued to the witness September 12, 1911, as Complainant's Exhibit Berry Patent No. 1002960, and ask that the same be marked in that manner. And you can mark the copies while I am out of the room.

Mr. Westall: Objected to for the reasons above noted

and as not proper cross-examination, as irrelevant to any issue in this case.

(Mr. Blakeslee hereupon leaves the room, and the exhibits last offered in evidence are marked respectively as requested in the offer, after which Mr. Blakeslee returns to the room.)

Mr. Blakeslee: We notice that counsel for defendant has just whispered privately to the witness, and in order that the record may show all the procedure in this case, we will ask the witness what was stated to him in such whispering.

Mr. Westall: The whispering referred to by counsel was during the recess taken at his request. I do not understand that there is any principle of law which prevents a witness from discussing the matter of his testimony during adjournment or during recess. There is absolutely no objection to a full statement of what passed between counsel and the witness during the entire recess. It is also admitted that certain things were said to the witness during the absence of counsel from the room, and the witness is instructed that he may, if he sees fit, explain fully just what passed between him and counsel during the recess.

Mr. Blakeslee: The record shows that there was no recess. It is assumed that counsel for complainant can leave the room safely during cross-examination of the witness without making any provisions for such absence, and when a witness is under cross-examination it is purely against regular procedure for the witness to discuss the case in any manner with the counsel who has presented the witness. We will therefore ask what took place as between the witness and counsel or any other

person present during the absence of counsel for complainant from the room, and also what was said in the whispered statement referred to in the last question.

Mr. Westall: It is also noted on the record that after the request by counsel for a recess the witness left the stand supposing, of course, there had been an adjournment for the time requested, and during the time he left the stand he was looking over the exhibits on the table.

Mr. Blakeslee: There was no recess in effect while counsel for complainant was out of the room. Procedure had been resumed by the offer of exhibits.

Mr. Westall: It is admitted that counsel should not have asked for the recess and acted as though there had been a recess if he did not expect that the Examiner should have noted it on the record and the natural consequences of the adjournment should follow.

Mr. Blakeslee: If there was any such recess it was terminated by the offer of the exhibits. But it was prior to leaving the room by counsel for complainant.

A. I will now explain fully everything that took place during this discussed time. Having left my seat at the time of the apparent cessation of cross-examination, I was looking over the exhibits on the table and counsel for defense said: "Are you sure this was a Cobb pressure regulator?" I replied that I had not examined the photographs in very great detail, having been under the impression for some time that these were Cobb devices, especially from his very intimate association with the design of the plant. The reason to question this had not arisen in my mind, my attention having been concentrated during the references to this device especially to the functions as an air chamber. Counsel for the defense

then said—I believe this is the whisper referred to—
“You can explain that your attention was concentrated on the air chamber features of this device.” That is all that occurred during the time mentioned.

Q. 713. By Mr. Blakeslee: Does this comprise all that was said by and between yourself and counsel for the defendant while counsel for the complainant was absent from the room?

A. That comprises everything that passed between counsel for defense and myself during that time.

Q. 714. Does it comprise everything that was said or done by or between yourself and any other person in the room during the absence of counsel for complainant from the room, and, if not, please state what occurred. You may leave the Special Examiner out of the question.

A. There were no other remarks except to the same intent on the part of any other person; no other remarks to any greater extent than already mentioned.

Q. 715. Were any remarks made by any other person during that period?

A. There was a similar question put by Mr. Doble at that time.

Mr. Blakeslee: In view of these admissions by the witness and in view of the previous coaching or attempted coaching of the witness under cross-examination, attention to which has been called on the record, we give notice of a motion to suppress the entire deposition of the present witness if complainant be so advised.

Mr. Westall: Is this a motion to suppress the deposition or is it not?

Mr. Blakeslee: The record speaks for itself.

Q. 716. By Mr. Blakeslee: Please state again what company you were with when you prepared the designs which you have testified you prepared for the apparatus of the Power Development Company plant?

A. I was working for two companies at that time, the Girard Water Wheel Company and the Electrical Engineering Company.

Q. 717. Whose property were the drawings or designs in this connection which you produced?

A. I did not know then and do not know now the exact interrelation of these two companies, but I presume they were the property of the Girard Water Wheel Company.

Q. 718. These designs or blueprints or tracings were delivered to you and presented to you separately, were they not?

A. They were not presented to me; they came into my possession.

Q. 719. How did they come into your possession?

A. By legal process.

Q. 720. And in what way?

A. As the result of an attachment for salaries due.

Q. 721. Now, in Defendant's Exhibit French and Swiss patents, a more or less constant flow of water is requisite in each of these devices, is it not, to maintain such governing action as each such device is capable of performing?

A. The flow of water required in the devices shown in the French patent and Swiss patent is that amount which is necessary to develop the energy called for by the load on the wheel.

Q. 722. And that flow is required to be more or less constant in each device, is it not?

A. It is not constant except under fixed conditions of load.

Q. 723. In other words, when the wheel is regulated or governed there is such flow of water in each device, is there not?

A. There is no constant flow in the governor action in either of these devices.

Q. 724. I do not think that is an answer to the question. Kindly read the question.

(The question is re-read.)

A. As I understand the question, it refers to a constant flow which does not occur in either of these devices during governor action.

Q. 725. Read the question again, please.

(The question is read.)

Q. 726. I will re-state the question in this way: In other words, when the wheel has been regulated or governed, and assuming that it is operating substantially without change of speed for a given period of time, this water flow in each device is practically constant, is it not?

A. If I correctly understand the conditions of this question, they inquire as to the conditions of flow in the pipe-line during a constant load on the wheel at the conclusion of governing action, in which case, I will state that the flow is constant under such fixed load condition.

Q. 727. And any water so flowing is wasted, as far as the operation of the particular wheel concerned is considered, is it not?

A. There is no water wasted under these conditions.

Q. 728. Does not some water escape from the duct

or bore e in the relief valve b in the French patent device?

A. There is no such escape of water during the fixed load condition.

Q. 729. That escape takes place during governor action, then, does it not?

A. That escape takes place during governor action.

Q. 730. And that water is wasted, so far as the patent specifies, is it not?

A. The quantity of water so used is so infinitesimal that it would hardly be considered as being either wasted or not wasted in the plant.

Q. 731. It is not utilized on the wheel?

A. It does not touch the wheel; it is used for another purpose.

Q. 732. What is it used for after it escapes?

A. It has no use after it escapes.

Q. 733. And how about the water utilized in governing in the Swiss patent device?

A. In the device as shown in the Swiss patent there is an exceedingly small constant flow of water through the regulating valve t.

Q. 734. And where does that water go to after it has traversed the various passages which confine it for governing action?

A. After being used to perform the function for which it is diverted it goes to the tailrace.

Q. 735. It does not go back into the penstock?

A. It does not go back into the penstock.

Q. 736. Then it is wasted, so far as utilization in the wheel?

A. It is not used for driving the wheel; it is used for another useful purpose.

Q. 737. That water so utilized is taken initially from the penstock near the gate?

A. As shown in the drawing it is taken from the penstock.

Q. 738. And in direct proportion to its quantity it varies the pressure in the penstock and the velocity of the water in the penstock, does it not?

A. The effect is so much less than infinitesimal, that I would not consider its effect in any sense.

Q. 739. The effect is in proportion to the amount of water so diverted, whether it be infinitesimal to a comparative or superlative degree?

A. This leakage of flow during constant load being fixed, does not affect the pressure in the penstock in any degree whatsoever, its effect being confined to the variation of flow which took place during governor action, during which time there are other and greater changes taking place to the effect that this cannot be at rest in any sense.

Q. 740. But that flow varies in quantity, does it not, during governor action?

A. To an exceedingly small amount.

Q. 741. And to that extent, be it infinitesimal or less than that, it affects the pressure and velocity normally maintained in the penstock, does it not?

A. Speaking in such infinitesimal terms, it possibly has such effect.

Q. 742. For some reason or other I notice that the area of the header or outlet point on the penstock from which the water is withdrawn from the penstock is quite

large. Can you explain why that was made of such considerable area?

A. I think a very reasonable explanation is that that part is used as a hand hole to remove any possible obstructions which might collect in the nozzle parts.

Q. 743. If obstructions collected there, would not they interfere considerably with the flow of water utilized in the governing action?

A. The total obstruction of that large outlet would, of course, prevent the flow of water to the governor. But it would require considerable accumulation to affect that flow.

Q. 744. But it would not require any very large accumulation to obstruct the flow of water through the smaller pipe which communicates with such larger outlet and with the governing features? Is that not so?

A. The total obstruction of the pipe B would naturally prevent the flow of water through the valve n. How much obstruction would be required to seriously impede this flow is a question of the relationship between the size of the pipe B and the flow of water required by the governor.

Q. 745. And a handful of leaves, a dead gopher, or other rodent, would be sufficient to obstruct that pipe, would it not?

A. It depends altogether on where such parts collected. If possible to divert any machinery made by man from its original purpose, we would naturally expect that provision is not made against interruption, and the consequences of interruption must be endured.

Q. 746. Now, in the operation of the apparatus of Complainant's Exhibit Lyndon Patent and in the oper-

ation of the apparatus of Complainant's Exhibits E to L, there is no chance, is there for anything contained in the water in the penstock to come into engagement with and interfere with or jam any of the governor features themselves, is there?

A. As I understand the question, it applies to the speed-sensitive elements in these two devices, in which case there could be no obstruction from the main water supply in these parts.

Q. 747. There could be no obstruction anywhere at any part of the governing mechanism of either such apparatus, could there, by any object or substance floating or carried in the water in the penstock, aside from the always present danger of such substances interfering with the water-wheel gate or by-pass itself, and over or around which the water must flow?

A. The question is indefinite in that it states conditions which do not pertain to these devices. Answering it to the best of my understanding, there can be no obstruction of the speed-sensitive parts of the devices shown in the Lyndon patent and the defendant's device. In the exception noted in the question, it is stated that water must flow at all times around and past the valves concerned in the governing, or words to that effect, which statement is not correct, inasmuch as in the defendant's device such water flows only when the valves are open, the automatic relief valve not being open except under particular conditions.

Q. 748. Well, we will try to be more definite. In neither the apparatus of the Lyndon patent in suit nor in the apparatus of Complainant's Exhibits E to L, and the allied exhibits, does any water from the penstock get

to flow over or strike any of the features of the governing mechanism whatsoever excepting the by-pass itself and the water gates themselves? Is that not correct?

A. Neither in the device shown in the Lyndon patent in suit nor in defendant's device as shown in Complainant's exhibits mentioned does any water from the penstock reach any part of the mechanism except those valves controlling the flow of water to the wheel, by the wheel, or for relief purposes.

Q. 749. And those valves are only what we have called in your testimony, and what you have called, the water-gate valves, or water-gate nozzle needle and the by-pass valve or relief valve or auxiliary by-pass valve or needle? Is that not correct?

A. Such valves include the main water-wheel gate valve and the by-pass valve shown in the Lyndon patent and the main needle nozzle valve and the valve of the auxiliary relief nozzle shown in defendant's device as illustrated in the exhibits mentioned.

Q. 750. In other words, the valves or gates controlled by the governor apparatus in each instance? That is correct, is it not?

A. These valves are controlled by the governor in both cases.

Q. 751. Then it would not be possible in the operation of either of such apparatus for any floating or drifting foreign objects or particles or things to reach and affect the operation of any by-pass governing mechanism in these exhibits, independent of the governor, gates or valves or needles, is that not correct?

A. Omitting the valves mentioned in my last answer, there is no way by which floating matter from the main

pipe-line can reach the governing devices except in such cases when the cylinder shown in defendant's exhibit may be operated by the water pressure from the pipe-line, as is sometimes done.

Q. 752. In Complainant's Exhibits E to P no such supply of water through any such cylinder is indicated, is there?

A. There is shown in one plant an oil pump; in another there is nothing shown which settles this question one way or the other.

Q. 753. Now, in Defendant's Exhibits French and Swiss patents it would require, in view of what you have called the infinitesimal amount of water utilized in the governing action, and the small dimensions or area of the conducting passages, and by-pass for such water used in governing, only very small objects or things floating in the water from the penstock to choke, jam or interfere with the governing operations? Is that not correct?

A. Unless provision is made to exclude such matter there might be choking action?

Q. 754. Now, objects which are not usually excluded from the pipe-line by the customary screen or grizzley might easily pass therethrough and be sufficient in size to interfere with the operation of governors of Defendant's Exhibits Swiss and French patents, might there not?

A. I am not posted as to the practice in the countries in which these patents were issued. I would expect that proper provision would be made to exclude such injurious matter in any case in which these devices were to be used.

Q. 755. Don't you think sand might interfere with

the action of the French and Swiss patent governors?

A. Sand in water on close-fitting metal parts would be likely to interfere.

Q. 756. And such close-fitting metal parts are indicated in the drawing?

A. There is no determination of the exact fit of these parts.

Q. 757. If the relief valve b did not have a close working fit it would not be operative?

A. It would be operative, except that there would be a small leak in proportion to the slightness of the fit.

Q. 758. It would not be as properly operative or sensitively responsive, would it? I am now referring to the French patent.

A. The difference would be slight. Provision has been made for such leakage in the small aperture leading from the chamber in the upper part of the differential piston shown in the French patent.

Q. 759. As the drawing illustrates it, the fit of that valve b is what is called a mechanical and close-working fit, isn't it?

A. The drawing does not indicate the nature of the fit to such a degree.

Q. 760. There is only a single line shown as marking the periphery of the relief valve and the inner wall of the cylinder containing it?

A. There is a single line shown, and no draughtsman could show two lines sufficiently close to differentiate between a close fit and a loose fit in such parts.

Q. 761. If there were a substantial or material leak there it would upset or disturb the working balance above or below the relief valve? Is not that correct?

A. It depends on the relation of the leak in the two parts.

Q. 762. Now, if sand passed through the relief valve in the French patent and got into the chamber above the relief valve through the ducts h, it would, if sufficiently accumulated, pack that chamber and prevent upward motion of the relief valve, would it not, and is this not true of any finely divided substance or detritus of any sort?

A. A sufficient accumulation of such matter in this chamber would naturally prevent movement. However, there is a sluicing action in the valve i when it is opened, tending to prevent such conditions.

Q. 763. Such a sluicing action was possible over the working surfaces of the by-pass which you have testified as having been present in the Power Development Company plant, was it not?

A. There was no condition in the Power Development Company plant analogous to this.

Q. 764. I will ask you, Mr. Berry, if you will please listen to the question again, and make any statement that you wish which is germane.

(The question is read by the Examiner.)

A. My answer must remain the same as before, inasmuch as the sluicing action to which I refer takes place from the chamber above this differential piston in the French patent.

Q. 765. Well, possibly it was indefinite, and I will ask another question. Is not a sluicing action possible over that by-pass?

A. If you were to contact the surfaces between the movable part and the fixed part of that by-pass, there

would be a sluicing action depending on the degree of looseness of the fit.

Q. 766. To what do you attribute the jamming of that by-pass valve in the Power Development Company plant?

A. I attribute it to the too close and mechanical fit, consequent upon the over-positive statement on the part of the owners of the plant that the water was entirely free from foreign matter of any kind. The assurances were so complete and satisfactory in this respect that an attempt was made to operate the hydraulic cylinder used in that plant by pressure water from the pipe-line.

Q. 767. In steam fitting or hydraulic work is there anything more simple to do than to correct too close a fit between two working parts, even if necessary by substituting one working part of proper dimensions to correct such too close fit?

A. Ordinarily a substitution of parts is not difficult.

Q. 768. And even dressing the surface of the by-pass valve with emery-paper or cloth might have been a help, might it not?

A. The dressing of such a surface with emery-cloth would have been somewhat of a job on account of its size. And furthermore, the provision of an additional support to this part gave satisfactory results during the course of my stay at the plant.

Q. 769. Well, if that was the case, how can you account for the removal and discarding of this by-pass at that time?

A. The removal of this by-pass valve, so far as my knowledge goes, was on account of the fact that the Girard wheels installed did not give the required effi-

ciency, and they were replaced by Tuthill wheels which, being supplied with deflecting hoods, did not require a by-pass valve inasmuch as these hoods performed that function.

Q. 770. If you were informed that those Girard wheels at that plant were used for a great many months, and during that period of time the by-pass valve or attempted by-pass valve was only used intermittently and only operated intermittently for a few days, and that the by-pass valve was several times disconnected from the rest of the governing device, and the plant was shut down because of this disconnection, could you volunteer any explanation of why ordinary mechanical skill could not have obviated such losses, interruptions, trouble and expense?

A. The conditions stated in the question carry their own answer, except that such conditions might well obtain in a plant not provided with shop facilities.

Q. 771. And that plant was only 15 miles from Bakersfield? Is that not correct?

A. Approximately so.

Q. 772. And in that city at that time there was a concern known as the Bakersfield Iron Works, was there not?

A. I cannot say.

Q. 773. You know there was a machine shop in that city at that time, do you not?

A. I do not remember at present that there was such a shop.

Q. 774. Didn't you have some machine work done during the time you were at that plant?

A. I do not remember having any machine work done; it might have been the case.

Q. 775. You do not know whether or not at that time there was a machine shop in Bakersfield?

A. I cannot say.

Q. 776. You do not know that this by-pass in the Girard wheels were sold as junk to the Bakersfield Iron Works in 1897 or early part of 1898?

A. I know nothing about this statement.

Q. 777. Now, it would not have been a very expensive or difficult thing to have designed and ordered from San Francisco a new by-pass valve of proper fit for that plant during the time you were up there, would it?

A. The question of the by-pass in the plant was, under the conditions obtaining as to efficiency, a minor point; and while it would not have been a particularly expensive job to have obtained a good part, the question of efficiency overshadowed those questions.

Q. 778. And, of course, there was not much efficiency on the line when the wheels were shut down to repair this by-pass? I suppose that had something to do with efficiency, from the commercial standpoint.

A. Efficiency is not used in this sense, to my knowledge.

Q. 779. I am speaking of efficiency as referring to the performance of the plant.

A. That question would depend on whether the load was sufficient to demand the entire output of the plant.

Q. 780. You knew about that time of other water-wheels of the Girard type with efficiency?

A. I did not know of any operating with a very high efficiency.

Q. 781. Did you not know of some that were sold and accepted?

A. I know of some that were put in use. Just what the efficiency was, I do not know.

Q. 782. You know of their having been in constant use at that time?

A. They were in use, so far as my recollection goes.

Q. 783. Now, referring to Defendant's Exhibit French patent, please tell me what would be the effect produced if some foreign object or substance from the pipe-line should jam the small duct at the lower end of the relief-valve b?

A. Under these conditions I would expect the by-pass valve to open on displacement of the valve i from its seat.

Q. 784. Would it close again?

A. It probably would not.

Q. 785. Now, supposing the small duct h leading into the chamber above the relief-valve b in the French patent should become clogged by foreign substances floating in from the pipe-line, what would be the result upon the action of the relief-valve?

A. If the aperture h h leading from the duct g into the chamber above the differential piston should become totally clogged I would expect the relief-valve to open.

Q. 786. And would it close again?

A. It probably would not.

Q. 787. Now, supposing an object should come into the pipe from the penstock and impact upon the lower end of the relief-valve b and force it violently upwardly,

what would be the effect upon the remaining portion of the governor shown in the French patent?

A. Making this impossible assumption, I would expect that some part of the mechanism would give way.

Q. 788. And that would violently disturb the performance of the normal functions, or intended performance of this apparatus, would it not?

A. There could be no such violent displacement of this piston b, inasmuch as to move it would require the displacement of water over it. However, in case that such violent displacement did through some impossible condition occur, there would be a disturbance of governor action.

Q. 789. And this would produce unfavorable pressures, and possibly dangerous pressures in this pipe-line, would it not?

A. It would not. It would lower the pressure therein.

Q. 790. Isn't that dangerous to governor action?

A. It is just as disturbing to governor action as an increase of pressure. It is, however, not dangerous to the integrity of the pipe-line.

Q. 791. In other words, the performance of the governor would be disturbed.

A. The performance of the governor would be disturbed.

Q. 792. Now, what you have testified about with relation to the obstruction of the various ducts and passages furnishing water to the governor parts in Defendant's Exhibit French Patent, applies similarly and in kind to Defendant's Exhibit Swiss Patent, does it not?

A. The construction in Defendant's Exhibit Swiss Patent being different from the other, the effects cannot

be the same, to the extent that there are differences in design.

Q. 793. I mean the passages being comparatively small through which such governing water passes from the penstock, relatively small obstructing objects would interfere with the flow of water and sand and the like would traverse such passages and block or jam the moving parts to a greater or less extent, and in a similar manner as testified? Is that not correct?

A. According to the best of my knowledge, devices made in accordance with this patent are in use, tending to show that the conditions described are prevented in some manner or other.

Q. 794. I understood you to testify a few moments ago that you were not acquainted with the practice of any such purported construction in European fields. Do you know of any such practice in any other field?

A. I did not so testify. My remarks in that connection had reference to a screen placed at the upper end of the pipe-line. My statement in the last answer has reference to certain information obtained in a general way by publications.

Mr. Blakeslee: As far as the last portion of the answer is concerned, we move that it be stricken from the record and withheld from consideration, as purely hearsay.

Mr. Westall: I will state right here that the answer is strictly responsive. One cannot tell where his general knowledge comes from. It might come from publications, or hearsay, or from many sources. When a witness testifies to the state of the art generally, his knowledge

must certainly have been gleaned from publications and books.

Q. 795. By Mr. Blakeslee: Have you ever seen any such apparatus like Defendant's Exhibit Swiss Patent drawing in operation?

A. I have never seen such machinery in operation, but I recall having heard Mr. Henry make the statement in public, or more particularly, that there was published a statement as a report of a discussion which he made a few years ago in which he stated that the Escher Wyss Company had used a rectangular intake in the by-pass valve in a certain installation in Mexico.

Mr. Blakeslee: We ask that all that portion of the answer referring to Mr. Henry and the like be stricken from the record and withheld from consideration as being merely hearsay and as not proper proof.

Q. 796. Now, to shorten if possible this line of inquiry, I will try to ask as clear a question as possible, as follows: Due to the small area of the several water passages entering into the circulatory system by which water from the penstock is utilized in Defendant's Exhibit Swiss Patent in governing operations, is there not in the use of any such apparatus, or would there not be danger of jamming and clogging and interference with the working parts of the governor, due to the entrance therein of any relatively small objects or particles such as you have testified might interfere with the action of governing apparatus constructed in accordance with Defendant's Exhibit French Patent?

A. The conditions in the two patents being in a general way somewhat the same, I would expect somewhat similar results in that direction if not provided against.

Q. 797. In view of the fact that you have stated that water losses would probably be infinitesimal due to the utilization of water in the governing operations in the apparatus of Defendant's Exhibits Swiss and French patents, is it not fair to assume that the various ducts and passages entering into the circulatory systems for supplying water for the governing operations are substantially minute in area and, particularly, the duct at the lower end of the relief-valve b in the French patent and the duct t controlled by the valve q in figure 4 of Defendant's Exhibit Swiss Patent drawing?

A. In the case of the French patent the loss of water is controlled by the amount of opening of valve i, and takes place only when this valve is opened. The loss is thereby controlled by amount of that opening, and the time interval in which it is opened. In the case of the Swiss patent, the leakage is constant. The passages, however, are necessarily constricted on that certain point.

Q. 798. In both patents the circulatory system mentioned has constricted points or portions which are relatively minute? Is that not correct?

A. There are small passages in both. Comparing the two, there are certain differences. As mentioned before, the leakage in the French patent is due to ~~the~~ amount and length of time in which the valve i is opened.

Q. 799. Relatively small objects, fine sand or very fine gravel, might clog these contracted portions of these circulatory systems? Is that not correct?

A. I would not expect sand to clog them. Gravel sufficiently large might. However, the entrance of such particles of sufficient size to clog these openings is pre-

vented by the fact that the size of the conduits on which these small parts lead, is so large relatively that the water in them would be quiescent, resulting in the settling of such particles and tending to prevent their entrance into the constricted aperture.

Q. 800. Are you prepared to say that there would not be any currents in these passages from the penstock to the circulatory system mentioned?

A. Whether there would be any currents would depend on the construction of the parts, and especially upon the distance of the small apertures from the main penstock.

Q. 801. Now, with the proportions shown in the drawings of the French and Swiss patents, judging them fairly, would not a wood-leaf passing thereto from the penstock be likely to jam and clog the small duct at the lower end of the relief-valve b in the French patent and the small duct t in the Swiss patent?

A. There is such a possibility.

Q. 802. Now, in Complainant's Exhibits Lyndon Patent and Complainant's Exhibits E to L, the by-pass gates or valves or needles are flushed and sluiced by water passing the same whenever such by-pass valves or the like are away from their seats? Is that not correct?

A. There must be a flow when the valve is opened, water under pressure being present behind it.

(The witness is temporarily withdrawn from the stand in order to permit the examination of another witness.)

B. C. Van Emon, called as a witness on behalf of defendant, being first duly sworn according to law, testified as follows:

DIRECT EXAMINATION

By Mr. Westall:

Q. 1. Where do you live, Mr. Van Emon?

A. San Francisco.

Q. 2. What is your business?

A. Manufacturer of elevators.

Q. 3. Have you any knowledge of an installation of a water-wheel plant at Bakersfield in 1896 and 1897?

Mr. Blakeslee: Objected to as irrelevant, immaterial, incompetent, and not within the issues of this case, and as involving something notice of which was not given in the answer disclosed in this case, and this objection will be understood as repeated without specific repetition to all questions put to this witness with respect to such matter.

A. Yes.

Q. 4. By Mr. Westall: Will you please state the names of any persons that you know of who were connected in any way with that installation, and also state what their connections were.

A. Mr. C. N. Beal was the manager and engineer for the Power Development Company at Bakersfield, and the hydraulic engineer was Mr. Edward S. Cobb of Los Angeles. Mr. Cobb come to me on the water-wheel of the Power Development Company which the Electrical Engineering Company was then

making for the Girard Water Wheel Company. Mr. S. L. Berry was draughtsman for the Electrical Engineering Company. I, myself, was the manager of the Electrical Engineering Company who were building the wheels at that time.

Q. 5. Did you ever visit the plant referred to at Bakersfield?

A. I did. It was completely in my charge.

Q. 6 You have mentioned the Power Development Company. What had they to do with the installation?

A. They bought it.

Q. 7 I now show you a photograph and ask you to state if you recognize what is represented in that photograph.

A. I certainly do. I know the two gentlemen sitting there.

Q. 8 Please state what you find the photograph refers to.

A. May I ask you to qualify that?

Q. 9 That is, in a broad general way.

A. The two standard Girard water-wheels coupled up through a controlling mechanism to an electrical generator.

Q. 10. Is that the mechanism which you refer to as having been installed by the Power Development Company

A. That is the plant put in for the Power Development Company by the Electrical Engineering Company, up to the dynamo.

Mr. Westall: Let the record show that the photo-

graph identified and described by the witness is Defendant's Exhibit Interior of Power Development Company's Power House.

Q. 11. Do you know what became of the drawings of the mechanism used in that installation?

Mr. Blakeslee: Objected to as leading and assuming a fact not testified to by the witness, and no foundation laid.

A. To the best of my knowledge they were burned up in the big fire of 1906.

Q. 12. By Mr. Westall: Will you please state fully the sources of your information which would lead you to believe that the original drawings referred to were destroyed as stated.

A. I was the manager of the Electrical Engineering Company and the Otis Elevator Company bought out the Electrical Engineering Company, and I was with the Otis Elevator Company nine months after the sale. During that nine months I know that the drawings were there in the files in the cabinets turned over to the Otis Elevator Company, and I learned afterwards that they were not stored in the concrete vault in the back of the building but were stored on top. When the big conflagration came they were burned, as near as I could tell.

Q. 13. Do you know who prepared the drawings referred to for the plant at Bakersfield.

A. Mr. Berry.

Q. 14. I now show you Defendant's Exhibit Journal of Electricity Vols. 4 and 5, and call your attention particularly to volume 4, No. 5, page 85, and to

an article labeled "The Bakersfield Transmission" under date of August, 1897, and ask you to glance over the illustrations on the page referred to and those on subsequent pages up to and including page 91, and state whether you recognize any of the illustrations there shown, and to state briefly what you find there disclosed.

Mr. Blakeslee: Objected to on each and all of the grounds of objection heretofore urged against this matter in these alleged publications, strictly on the ground that they are not identified and no proof of publication, and further, on the ground that they are not to be considered under the pleadings of this case, notice of the same not being given by the answer interposed by the defendant, and as not calling for the best evidence.

A. Yes. I understand page 85 is a general view of the power house and pipe-line and spillway of the power plant at the mouth of the Kern River. On page 87 the middle cut is the side gate which I recognize as I passed it many a time when the plant was in operation. The top view on page 89 I recognize as the sawmill and lumber incline where the lumber was cut and hauled up to the mouth of the flume, where it was taken and put in place, as I was there at the time that work was being done. The other photographs up to and including page 90 were work done before I was on the ground. On page 91 is a photograph or cut of the interior of the station and is very familiar to me, as I was several months working upon

this job and was very familiar with all connected with the same.

Q. 15. Please state the names of the persons you find represented in the last illustration referred to, namely, that on page 91 of the Journal of Electricity, as to which you have testified.

A. That is Mr. Berry sitting with his back to one of the water-wheels. Mr. McMurdo, the surveyor, is sitting with his back to the generator. A man with overalls lying on the floor I do not recognize.

Q. 16. Please compare Defendant's Exhibit Interior of Power Development Company's Power House with the illustration to which you have just referred.

A. The cut on page 91 is taken from the photograph.

Q. 17. Please state, if you can, when you spent the several months that you have testified to having spent at the Power Development Company plant at Bakersfield.

A. In 1896 and 1897 I was there when they were grading out for the power house and started the flume, and I did work there after the plant had been running over two years and between those times I did a great deal of repair work and changes for the Power Development Company. But as to the exact dates, I cannot give them.

Q. 18. I now call your attention to Defendant's Exhibit Journal of Electricity Vols. 4 and 5, and particularly to certain cuts found on page 110 of volume 4, No. 6 under date of September, 1897, under the

title "Water-Wheel Governing", and ask you to state if you recognize the mechanism illustrated in the cuts referred to.

A. I do.

Q. 19. Please state where you have ever seen mechanism of that character before.

A. The upper cut on page 110 shows one of the wheels with the cover removed, and the opposite wheel with the levers connecting the contracting nozzles together with the hydraulic overtake governor for controlling these nozzles, with the bell-cranks and levers passed through the bottom casing in which the exposed wheel is shown. These levers are connected through the bottom in the lower cut on the same page, and are fulcrumed up to the centrifugal governor in the fly-wheel. On the opposite page, 111, is shown a cut of the centrifugal governor with its levers and springs. These I am familiar with, as I think Mr. Berry designed and laid out all of this work.

Q. 20. I now place before you Defendant's Exhibit ZZ and Defendant's Exhibit XX, and ask you to compare the two exhibits referred to with the cuts upon page 110 of volume 4, No. 6, of the Journal of Electricity to which you have just referred.

A. They are both the same. The cuts on page 110 are the same as the photographs I have before me.

Mr. Westall: You may inquire.

CROSS-EXAMINATION

By Mr. Blakeslee:

Q. 21. When you refer to the standard Girard water-wheels as being at the Power Development Company plant, what did you mean by "standard"?

A. That was the name that was given at that time.

Q. 22. It was called the "Standard" wheel?

A. That is what they attempted to call it. The Standard Girard Water Wheel.

Q. 2. Have you ever seen any other Girard wheels of this type in operation.

A. I never have.

Q. 24. When did you last see the original drawings of the Power Development Company plant installation?

A. Some time in the early part of 1901.

Q. 25. Then you know nothing of your own knowledge of the whereabouts of these drawings from the year 1901 until the 18th of April, 1906, when the earthquake and fire commenced in San Francisco. Is that correct?

A. That is. I don't know anything about it.

Mr. Blakeslee: In view of the last two answers of the witness, we ask that all his testimony relating to the alleged burning up of the purported original drawings of the Power Development Company's plant and their storage on top of the vault and outside of the vault, and all his testimony, in fact, relating to these drawings subsequent to the year 1901, be stricken out from the record and withheld from

consideration, as amounting to mere hearsay and not actual knowledge of the witness.

Q. 26. Was it the year 1899 that you left the Power Development Company plant?

A. No; I think I did some work there in 1900, a short time before I left the Electrical Engineering Company.

Q. 27. What work did you do there at that time?

A. I rebuilt some of their head gates in the fore-bay at the top of the pipe-line.

Q. 28. What type of water-wheels were set up at that plant at that time?

Mr. Westall: The question is objected to as not proper cross-examination, the scope of the direct examination went simply to the drawings and to the identity of these photographs.

A. Knight wheels.

Q. 29. By Mr. Blakeslee: What other kind of work did you do at that plant in the year 1900?

Mr. Westall: This is also objected to as not proper cross-examination.

A. The contracting nozzles on the Knight water-wheels were badly worn—the pins and fulcrums and levers that operated it—and I took them out and took them to Bakersfield and had them bushed and pins made and slight changes made in the construction of it.

Q. 30. By Mr. Blakeslee: What kind of a governor were they using on the Knight wheels, an automatic governor or a hand control?

Mr. Westall: I would like to have the question

specify the time, in order that I may know whether this is cross-~~ex~~amination or not. The question is objected to as not being proper cross-examination. The direct examination did not go into the complete history of all the movements of the witness after he left the Bakersfield plant during the construction.

Mr. Blakeslee: The defendant has opened the door to cross-examination as to anything about this plant within the knowledge of the witness, as to the antecedents of the construction which he says he assisted in designing and setting up and the subsequent history of the same and of the plan including the same.

Mr. Westall: And notice is hereby given that if counsel persists in this line of questioning he makes the witness his own, and subject to cross-examination.

A. I am not sure, but I think it was hand control.

Q. 31. By Mr. Blakeslee: Do you know whether these Knight wheels were put in directly after the discontinuance of the use of the Girard wheels at that plant?

A. They were not.

Q. 32. What wheels were put in in that interim?

Mr. Westall: The same objection.

A. Tuthill wheels.

Q. 33. By Mr. Blakeslee: Do you know what kind of a governor was used on the Tuthill wheels, and, if so, state what.

Mr. Westall: It is to be understood that the

same objection is to be noted to the entire line of these questions, it very clearly not having been touched in the direct examination.

A. Well, they tried to use a governor that was on the Girard wheels, and there was a period of some months that I was not there and during that time the wheels were taken out and Knight wheels were substituted, and I don't know exactly how they tried to control the Tuthill wheels.

Q. 34. By Mr. Blakeslee: Isn't it true and don't you know that when this attempted use of the governor on the Tuthill wheels failed——

Mr. Westall: Objected to as very grossly leading.

Q. 35. By Mr. Blakeslee: (continuing) —the hand control of those wheels was resorted to?

Mr. Westall: The question is objected to as very grossly leading. It is manifest from the record that counsel has taken the witness as his own and is making a direct examination of this, and we object to leading and attempting to put in the mouth of the witness testimony in this matter.

A. No; they did not use hand control. They were still trying to work the automatic governor.

Q. 36. And when the automatic governor did not work what happened?

Mr. Westall: The same objection.

A. They took the wheels out.

Q. 37. By Mr. Blakeslee: When the Girard wheels were put in up there, was there any opening provided from the pipe-line to the tailrace other than the passage to the water-gates?

Mr. Westall: The same objection.

A. Yes; there was a by-pass put in.

Q. 38. By Mr. Blakeslee: Was there anything in that by-pass?

Mr. Westall: The same objection.

A. A plug cock valve.

Q. 39. By Mr. Blakeslee: Was that plug valve in the by-pass on the pipe-line when the Tuthill wheels were attempted to be operated at the plant?

A. It was.

Q. 40. When the Tuthill wheels were put in that plant at that time the Girard wheels and apparatus were discarded from the pipe-line at the union at the hydraulic gate marked F shown in Defendant's Exhibit Interior of Power Development Company's Power House. Is that not correct?

Mr. Westall: Objected to for the same reasons as noted on the record.

A. The hydraulic valves remained there, but from that point on there were new pipes to the wheel.

Q. 41. And that is, the pipes or parts J and G over this in the plant in this photograph were taken out, were they not?

Mr. Westall: The same objection.

A. Yes, sir.

Q. 42. By Mr. Blakeslee: Do you know whether that plug valve was operated in connection with the Tuthill wheels at that plant?

A. I don't know that. I know it was there, but I don't know whether they operated it.

Q. 43. Do you know whether it was hooked up

with the governor features when the Tuthill wheels were there?

Mr. Westall: The same objection.

A. I wouldn't be positive. I know it was there and held by a support, the gate and the——

Q. 44. By Mr. Blakeslee: You mean to act as a base and support for the pipes leading to the penstock?

A. I know it was there, but why it was there I don't know.

Q. 45. You mean the casting or shell such as is marked J?

A. Yes.

Q. 46. And this was left in the part marked J when they took out the Girard installation?

Mr. Westall: The same objection.

A. It was there with the wheel when the Tuthill wheels were in. Then they made some changes and done something else, and I was away at the time, and when I came back the Tuthill wheels were out and the Knight wheels were in and that was gone.

Q. 47. By Mr. Blakeslee: When you came back the Knight wheels were in and the part J in the photograph was gone?

A. It was gone.

Q. 48. What was the general nature of your work when you were there during the period of time you were at this plant?

A. I was general manager of the installation of the hydraulic plant.

Q. 49. How long a time?

A. All the time.

Q. 50. Did you do some machine shop work there?

A. Well, not there. We did at Bakersfield.

Q. 51. Some of it was done at the Bakersfield Iron Works?

Mr. Westall: It is to be understood that the same objections are repeated to all these questions as not proper cross-examination.

A. I think so.

Q. 52. By Mr. Blakeslee: The Bakersfield Iron Works had a good and efficient machine shop, did it not?

A. I think it had; yes. I don't remember. I went there and gave instructions and gave sketches that I had made, and they were sent out to the canyon where I was carrying on the rest of the work with my men.

Q. 53. And the machine shop work that you had done at the Bakersfield Iron Works was satisfactorily done, was it not?

A. I believe so.

Q. 54. And that was only about 15 miles from the plant, wasn't it?

Mr. Westall: The same objection.

A. It was more than that; 16 or 18 miles, or something like that.

Q. 55. By Mr. Blakeslee: There were other machine shops in Bakersfield at that time, were there not?

Mr. Westall: The same objection.

A. Yes. The Power Development Company had a shop and we did some work there.

Q. 56. By Mr. Blakeslee: You mean the same company that owned this plant?

A. I believe so. That is where I was sent to to have it done.

Q. 57. The Power Development Company at that time, in its shop, had metal-working lathes and drill presses, did it not?

A. Small ones.

Q. 58. What was it that took about two months to set this plant up in 1896 and get it running

Mr. Westall: Objected to for the same reason heretofore noted.

A. It was pretty heavy stuff to handle. The pipes did not come in line, and the dynamos either did not line, and the hydraulic lines were stuck; we took them to Bakersfield and took the pistons out of them and made new cup leathers and new pistons and brought them back, and that took up the time.

Mr. Blakeslee: That is all.

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Mr. Blakeslee: It is to be understood that the cross-examination of the present witness Van Emon, or any recross examination, was and is to be considered as subject to all of the objections of record with respect to the testimony of said witness and the matters inquired into, and particularly the objection that the matters inquired of are not within

*B.C. Van Emon
recalled
redirect examination*

By Mr. Westall

the issues of this case, notice of the same not being given in the answer interposed by defendant. This objection has been many times made in the record, and is understood and has been understood as repeated to each and every matter of testimony or evidence considered which is not within the issues in the case and outside of the answer interposed, but this specific statement is made at this point in order to preserve the notice and objection in connection with this specific witness, and in such cross-examination of this witness or of any other witness on any such matter outside of the record of the pleadings it will be understood as not in any sense waiving such objections to such testimony or evidence, and to be purely subject to such objections, pending the ruling of the Court upon the same. Furthermore, it is to be noted that that is the understanding which was reached in open court upon the consideration of defendant's motion for leave to amend the answer, and that a stipulation was made in open court that such objections should stand and be in force and effect until and unless cured by an order granting defendant's leave to amend his answer and introduce new defenses. So that all cross-examination of witnesses of the defendant are to be understood as subject to the reiterated statement just made, and subject to confirmation of such objections consisting in the stipulation made in open court, whereby such objections were memorialized and understood to be continued until and unless cured by leave to the defendant to amend his answer.

Mr. Westall: In failing to answer fully the argument of counsel, it is not to be understood that any of the conclusions expressed therein are agreed to by counsel for defendant. It is pointed out that upon examination of the witness Van Emon counsel has made the witness his own to a certain extent, and that the objections just above noted were not made at the time of the examination of this witness, counsel evidently intending to attempt to use the evidence elicited on direct examination if it supported his case, but to insert his objection afterwards if he found that it was not what he desired.

Mr. Blakeslee: The whole answer to this proposition is that the matters inquired into not matters of cross-examination are not within the pleadings and cannot be considered by the Court unless the situation be cured or leave to the defendant to amend the answer be given. The objections mentioned were registered fully prior to the direct examination of the witness Van Emon and control his whole deposition. It is elementary that when the door is opened by direct examination of a witness on any matter that it cannot be closed by his counsel by mere objection to proper questions directed at the various surrounding facts and circumstances which defendant may wish to have barred from inquiry solely because he fears to produce such evidence in direct examination.

Q. 59. By Mr. Westall: Mr. Van Emon, do you know why the wheels were taken out at the Bakers-

field installation and substituted by others as you have testified?

A. Which wheels?

Q. 60. The wheels that were first put in.

A. Yes. They were taken out because they did not develop the power or did not have the efficiency they were supposed to have.

Q. 61. How many changes of wheels do you know of that were made there?

A. Well, there were two other sets of wheels—different makes of wheels—put in after the Girard.

Q. 62. Now, it was purely a matter of efficiency of the wheels that caused the change, wasn't it?

Mr. Blakeslee: Objected to as cross-examination of defendant's own witness, and as leading.

Mr. Westall: As before stated, this is to be conceded a cross-examination upon matters that were not touched upon in the direct examination of this witness.

Mr. Blakeslee: Further objected to as calling for a conclusion on the part of the witness. And we further notify counsel that if he pursues this course the whole deposition will be subject to suppression because of violation of all the rules of evidence, and as a manifest attempt to again under the guise of cross-examination to put in something which he feared to attempt to question under direct examination.

Q. 63. By Mr. Westall: Do you know whether or not the substitution of other wheels was caused by any defect or failure to properly operate of the

governing mechanism that was used at Bakersfield by the Power Development Company at the time you have heretofore mentioned?

Mr. Blakeslee: Objected to as leading and as cross-examination of Defendant's own witness, and as endangering the integrity of the entire examination of this witness and the rights of complainant thereunder, and notice is hereby given of a motion to suppress the entire deposition and that it be stricken from the record and withheld from consideration.

A. No. The cause was the inefficiency of the wheels to produce the power required by the Power Development Company.

Q. 64. By Mr. Westall: What have you to say as to the operation of the governing mechanism and particularly the by-pass arrangement in use at the plant referred to?

Mr. Blakeslee: The same objection.

A. There never was any question about the governing mechanism of the Girard water wheel.

Q. 65. By Mr. Westall: In other words, the governing mechanism gave entire satisfaction as a governing mechanism? Is that correct?

Mr. Blakeslee: The same objection, and that it is calling for a conclusion of the witness.

A. Yes, sir.

Mr. Westall: That is all.

RE CROSS EXAMINATION

By Mr. Blakeslee:

Q. 66. As a matter of fact, the entire Power

Development Company plant which you have testified about was unsatisfactory when the Girard wheels were in attempted use? Is that not correct?

A. No; that is not correct.

Q. 67. I should probably have excluded the generators. I mean the entire hydraulic parts—the power developing part—inside of the power house.

A. No. Parts of it were all right.

Q. 68. But as a single installation or set of mechanism it was not satisfactory, was it?

A. It was satisfactory except the power of the wheels. That was the one question taken up.

Q. 69. What part of the Girard wheels was it that to your mind was deficient in proper action?

A. The nozzles and also the wheel.

Q. 70. You know those wheels and the by-pass valves were taken out of that plant very soon after they were put in there. Do you not?

A. No, they were not.

Q. 71. Are you sure of that?

A. Yes.

Q. 72. How long do you think they were in there?

A. They were in there some little time after the Girard wheels were taken out.

Q. 73. What was in there?

A. The by-pass and governing mechanism.

Q. 74. Do you mean the by-pass valve or the casing of the by-pass valve which you referred to yesterday?

A. The valve and casing.

Q. 75. Do you know that the opening from the by-pass valve casing to the tailrace was sealed up in not many months after the Girard wheels were first attempted to be operated?

A. No, sir; they were not.

Q. 76. Are you sure it was not sealed up?

A. Sure. I had absolute charge of the whole proposition.

Q. 77. When did you last see the opening of the tailrace?

A. At about the time the Tuthills put their wheels in.

Q. 78. And that was how long after the Girard wheels were put in?

A. I could not give you the exact dates, but it was a month or so after the Girard wheels were taken out, because the Girard wheels were lying outside of the power house at that time.

Q. 79. And where was the by-pass valve at that time?

A. It was in the same place; on the bed plate as it originally was.

Q. 80. Are you sure that the by-pass valve was in the by-pass valve casing?

A. No; I did not see the inside of it. I couldn't.

Q. 81. If someone should testify that that had been taken out at the time the wheels were taken out, you would ~~would~~ not contradict that, would you?

A. I would not. I could not see the inside of the valve, and it might have been taken out and

the valve body might still be there. The valve body was there after the wheels were gone.

Q. 82. You mean the casing?

A. The casing in which this by-pass was in. That was there.

Q. 83. Did you have anything to do with taking out the Girard wheels?

A. No, sir.

Q. 84. Were you there during the taking out?

A. No, sir.

Q. 85. You saw the wheels lying outside?

A. After they were taken out.

Q. 86. Was that the last time that you saw that by-pass valve casing?

A. It is the last I remember of it.

Q. 87. When the Girard wheels were taken out of course the nozzles were token out and disconnected from the by-pass valve? That is correct, isn't it?

A. Yes.

Q. 88. And after that was done no water could pass through the by-pass casing at any time from the main pipe unless there were a reconnection of the by-pass mechanism. Is that not correct?

A. That I don't know, whether they were reconnected or not.

Q. 89. You never saw the by-pass features reconnected after the Girard wheels were thrown out?

A. No; all I know is that the body was there after those wheels were in.

Q. 90. And by "body" you mean casing

A. I don't know what was in it; I could only see the outside.

Q. 91. You don't mean the turning part of the valve?

A. That I don't know. It was all there in position—

Q. 92. Do you know what kind of a valve that was?

A. I do, exactly.

Q. 93. You couldn't see the inner working parts?

A. No, we couldn't see it without examining it. They might have plugged it up and not used it. Part of that stuff was fastened to it.

Q. 94. And you don't know how much of the by-pass valve mechanism was there when you saw the Girard wheels lying outside?

A. No. All I know is it wasn't taken out of the wheels. What it was for, I don't know.

Q. 95. You don't know that there was anything inside of the by-pass mechanism after the Girard wheels were taken out? Is that correct?

A. That is correct.

Q. 96. And you don't know whether any part of that by-pass mechanism was ever connected up with any of the subsequent water-wheels following the taking out of the Girard wheels, do you?

A. No; I do not.

Q. 97. Do you know what the efficiency as shown by that plant when the Girard wheels were attempted to be operated was?

Mr. Westall: Objected to as not proper redirect examination.

A. No; I do not. There were efficiency tests made and they varied so that I didn't take them into consideration at all. I heard the figures, but I know the wheels would not and could not develop the power required.

Q. 98. By Mr. Blakeslee: Were you there when those efficiency tests were made?

A. I was.

Q. 99. Who made those tests, do you know?

A. Mr. Cobb and Mr. McMurdo.

Q. 100. What Mr. Cobb is that?

A. Edward S. Cobb of Los Angeles.

Q. 101. What would you have considered a good efficiency for those Girard wheels used at full load, say?

Mr. Westall: Objected to as incompetent, irrelevant and immaterial. The efficiency of the wheels can have no possible bearing on this case.

A. Ninety per cent.

Q. 102. By Mr. Blakeslee: Did you ever know of a water-wheel which gave 90 per cent efficiency?

A. No; I never did.

Q. 103. Were not you probably expecting an awful lot of those Girard wheels?

A. We were; that is true.

Q. 104. They were assumed to be a pretty fine proposition?

A. That is the way I understood them.

Q. 105. Supposing another type of wheel had

gone in there: what efficiency would you have been satisfied with, and you can mention the type of wheel if you wish.

A. I am not posted on those wheels as to their efficiency. But if we got 65 or 70 per cent we would have been doing well.

Q. 106. And would you consider that the Girard wheels put in there were a failure from an efficiency standpoint if they had shown an efficiency of 75 per cent on full load?

A. No; they would not.

Q. 107. You would not have considered them a failure from the efficiency standpoint?

A. No, sir.

Q. 108. Well, supposing on full load they showed an efficiency of 81 per cent. Wouldn't you have considered that they were highly and unexpectedly efficient?

A. I certainly would have.

Q. 109. What was approximately the full load of those Girard wheels?

A. About 450 horse power, or something like that. That is, you mean by "full load" what they would produce?

Q. 110. There were two Girard wheels fast to one shaft in that plant, were there not?

A. There were.

Q. 111. Are we to understand that what those two wheels produced was 900 horse power maximum?

A. No.

Q. 112. Then your estimate or statement of 450 horse power covered both wheel units?

A. Both wheel units.

Q. 113. That is the total power of the two wheels—

A. Yes; the total power of the two wheels.

Q. 114. —is a full load capacity of 450 horse power?

A. That is about it.

Q. 115. Would be surprised if you were told that those wheels gave approximately 700 horse power at full load?

A. I don't think so.

Q. 116. You would not be surprised

A. I would be surprised; yes.

Q. 117. And if you were told that those wheels would give approximately 700 horse power at full load and developed an efficiency of over 80 per cent, would you be willing to admit, assuming those statements, that those wheels were remarkably efficient?

A. I would.

Q. 118. And if that were demonstrated to you, would you be satisfied that those Girard wheels were thrown out because they were lacking in efficiency?

A. That is the reason they were thrown out; inefficiency.

Q. 119. I am not asking you to go as far as that, Mr. Van Emon. I am asking you to tell me whether you would be satisfied with the judgment of any person in charge who threw out those Girard wheels if you were convinced that they developed an effi-

ciency of over 80 per cent at an output of 700 horse power?

Mr. Westall: The question is objected to for the reasons before stated, and it is to be understood that the same objection is repeated to this entire line of redirect examination. There is no wheel shown in the Lyndon patent. The matter is entirely outside of the issues in this case, and its only purpose, apparently, is to incumber the record and introduce confusion into the record.

Mr. Blakeslee: The defendant apparently hopes to rely somewhat on the Power Development Company's abandoned experiment as an anticipation in part of the Lyndon patent. It has been testified by defendant's own witnesses that the original installation was in part inefficient, and defendant has introduced purported written evidence to that effect, and several of defendant's witnesses, or one or more of the same, have admitted that parts of that original installation alleged to have included the features testified to voluminously by the witnesses for the defendant was or were discarded. If there can be any doubt in anybody's mind that it is material to the determination of this possible issue in defense to inquire into the whys and wherefores of the failure of said alleged installations to operate, we will leave the matter confidently to the Court for determination.

Mr. Westall: I will not reply to the inaccuracies in this statement as to what the record shows. It is very evident that counsel must have misunder-

stood the testimony given so far, and the correction of that matter will be left to argument on final hearing.

Q. 120. By Mr. Blakeslee: How much of the time were you present at the Power Development Company plant during the attempted use of these Girard wheels there?

A. All of the time. They were in my charge.

Q. 121. How long a time was that?

A. Some six months or more.

Q. 122. Was anybody else there assisting you in such work or performing part of the work of taking care of that installation?

A. Yes; Mr. Berry.

Q. 123. How long was he there?

A. About two or three weeks, I think.

Q. 124. Anybody else?

A. Not outside of myself, who had any authority whatever.

Q. 125. Are you and Mr. Berry electrical engineers or were you at that time?

A. Mr. Berry was a hydraulic engineer.

Q. 126. Who did the electrical engineering part of that plant?

A. J. A. Lighthipe.

Q. 127. He is now electrical engineer for the Southern California Edison Company?

A. He is.

Q. 128. Was he there considerable of the time?

A. Yes: considerable of the time.

Q. 129. How much of the time was Mr. Light-hipe there?

A. Well, that is hard to say. He was there weeks at a time when I was there and he was there at times when I was not there. I could not tell you. We were there from the starting of the machinery till the plant was turned over to the Power Development Company. We had charge of it.

Q. 130. What experimental work did you do in getting that plant into the best possible shape that you could get it into?

A. Well, the only experimental work we did was on the hydraulic controlling apparatus of the nozzles.

Q. 131. You had to do away with the use of water for that and substitute oil, didn't you.

A. We did. The water was very gritty and clogged up the valve.

Q. 132. It clogged up the by-pass valve badly, didn't it?

A. A little when we first started; but we had it too close. We had it set too tight to work properly. Even outside of the dirty water it would not work; it was too close.

Q. 133. It was not the right type to have?

A. It was all right when we took it out and relieved it.

Q. 134. Don't you think a needle valve would have done a better job?

A. There might be a design that would do it as good or better, but it did the work.

Q. 135. How many times did you have to disconnect the by-pass valve from the governing mechanism?

A. I don't know. I don't remember. A few times. When we got it eased up it worked all right.

Q. 136. You had to stop the wheels when you did so, didn't you?

A. Yes; there were two sets of wheels—two units—and it only required one to furnish the power.

Q. 137. And you had to shut down?

A. We shut one down and started the other one.

Q. 138. What parts were broken in the mechanism which connected up the by-pass valve with the governor and the wheel nozzles?

A. The lever on the end of the by-pass valve.

Q. 139. How many times did that break?

A. I don't remember. One, is as far as I remember we worked on, and we discovered our troubles. It was working too hard and we had to find out what it was.

Q. 140. What occasioned that breakage?

A. It was too tight in the casing. It was an air-tight fit. It was too close.

Q. 141. What would you call that governor that was used there, as to the type?

A. Which part?

Q. 142. I mean the part which controlled the governing action.

A. Well, that was taken from an old governor N. S. Keith designed here years ago when I was his foreman. We used it on electric motors holding the speed for constant current motors.

Q. 143. What was the general principle of it?

A. It was a load governor, as I term it. The load controlled between that and the centrifugal force of the weights controlled the position of the weights which in turn controlled the position of the piston—

Q. 144. It was a load-sensitive governor, was it?

A. It was.

Q. 145. That governor that you and Prof. Keith worked up was not used for governing hydraulic plants, was it?

A. When?

Q. 146. The first one used or the one you and Prof. Keith got up before the Bakersfield installation?

A. Yes, sir; I put it on a water-wheel before the Bakersfield plant.

Q. 147. What water-wheel?

A. A water-wheel that was sold to the Mammoth Bar Gold Mining Company on the north fork of the American River.

Q. 148. Did you ever see another governor of that construction?

A. No, I never did.

Q. 149. Did Mr. S. L. Berry tell you that he was the inventor of that apparatus installed up

there at the Power Development Company plant in connection with the Girard wheels?

A. No.

Q. 150. Did you ever hear anybody say that he was?

A. No; I never did.

Q. 151. Who was said up there to be the producer of that design of mechanism connected up with the Girard wheels?

Mr. Westall: Objected to as calling for hearsay evidence. What was said is clearly calling for hearsay evidence, and is also incompetent, irrelevant and immaterial. The other objections heretofore made are repeated.

A. Where?

Q. 152. By Mr. Blakeslee: The mechanism at the Power Development Company plant. I will put it this way: Who was supposed to have originated, or who were you given to understand had originated the design of apparatus put into that plant with the Girard wheel?

Mr. Westall: The same objection, as calling for hearsay evidence.

A. I was in charge and had the say, and Mr. Berry was the engineer employed by the Electrical Engineering Company, and between the two of us we laid out this governing mechanism, the hydraulic end of it, and the water-controlling mechanism.

Q. 153. By Mr. Blakeslee: You did about as much of it as Mr. Berry did?

A. I think so.

Q. 154. Didn't you suggest the use of that by-pass there?

A. I did.

Q. 155. Did you ever put in in any other power plant such a by-pass valve as that?

A. I did.

Q. 156. When and where?

A. I can't tell you exactly when. It was in that plant on the north fork of the American River in the Mammoth Bar Gold Mining Company.

Q. 157. I mean when after the Power Development Company plant?

A. I don't think so, after that.

Q. 158. Were you present personally during all of the testing of the Girard wheels at the Power Development Company plant?

A. No; I was not witnessing all of it.

Q. 159. Were you about the power house all the time?

A. I believe I was.

Q. 160. Do you consider that they made a good and efficient test of the wheels?

A. I thought so at the time; yes.

Q. 161. You have stated that subsequent to the attempted use of this governor device at the Power Development Company plant you know of no further example or instance of the use of such a governor device, and I am referring to the one which you say you and Prof. Keith devised. Is that correct?

A. I don't understand your question.

Q. 162. You know what I mean by the governor device which you say you and Prof. Keith got up?

A. Yes, sir.

Q. 163. Do you know of such a governor device ever being used other than the one put into the Power Development Company plant and subsequent to the time it was put in there?

A. No; I do not. The Girard Water Wheel Company shortly afterwards went out of business. That terminated my connection with hydraulics.

Q. 164. The governor that you and Prof. Keith originally got up was used as a load governor on electric motors, was it not, to shift the brushes on the commutator under load changes?

A. That was the purpose of it.

Q. 165. And the shifting of those brushes and pressure carriages was a matter of load adjustment and not speed adjustment, was it not?

A. Well, speed was a factor in the case.

Q. 166. But the shifting that was done was prompted by changes in load?

A. Yes, sir.

Q. 167. There was a pressure-responsive device on the pipe-line at the Power Development Company plant just outside of the power house, was there not?

A. What I understand you to mean is that there was an air chamber on the end of the pipe-line?

Q. 168. I want to know what it was. Can you tell me any more fully what it was?

A. The question is not clear as to what you mean.

Q. 169. I said a pressure-responsive device. If there was any such thing, tell me what it was.

A. Yes; there was an air chamber at the end of the reservoir where the pipe terminated.

Q. 170. What was that chamber there to do?

A. To take up the shock of the water if it happened to be shut off suddenly.

Q. 171. And to some extent to compensate for change of pressure in the pipe-line?

A. Sudden changes.

Q. 172. Who installed that air chamber?

A. The Lacey Manufacturing Company of Los Angeles, I think, were the contractors for the pipe.

Q. 173. Do you know who ordered it put in?

A. Edward S. Cobb.

Q. 174. Was there any other pressure relief devices on that pipe-line?

A. No.

Q. 175. You are sure there were not any air valves or relief valves on the pipe-line?

A. Not relief valves. There were air valves on the pipe in case of a vacuum, if anything should give way below, to relieve it from the outside air pressure.

Q. 176. How did that air chamber on the pipe-line act in general?

A. Well, if there should be a sudden stoppage of the flow of water the air would compress and take up that sudden shock.

Q. 177. And then when the air expanded again there would be a back-kick into the pipe-line?

A. Well, it would force the water back into the pipe-line.

Q. 178. It would set up a condition of elastic oscillation?

A. Yes.

Q. 179. So whenever the pressure was eased, there was a succeeding rebound and increase of pressure, was there not?

A. It was there for that purpose. It was customary in all pipe-lines in power plants to put on an air chamber in pipe-lines.

Q. 180. They do not do it on all plants now, do they?

A. Yes.

Q. 181. What plant can you mention as having such an air chamber now?

A. The last one that I saw was at Grass Valley, at the North Star Mine. The pipe-line that they have there has an air chamber on it, and all that I ever saw have air chambers.

Q. 182. One was put there about 1896, wasn't it?

A. I think it was somewhere along about that time.

Q. 183. Do you remember any other plants where you have seen such an air chamber on the pipe-line?

A. Yes; there was one on in Gold Valley about '94 or '95, or somewhere along there.

Q. 184. Do you remember any others after that?

A. I do not just recall where they are. I have

seen several plants that I noticed an air chamber on.

Q. 185. You cannot recall just when or where?

A. No; I cannot, right off hand, without thinking.

Q. 186. Have you visited the hydro-electric power plants off and on for the last ten years?

A. When I have time I always go around to see them.

Q. 187. Have you seen quite a number?

A. Not lately.

Q. 188. During the last ten years?

A. No; not many.

Q. 189. Have you seen any for five years?

A. No; I have not seen any for five years.

Q. 190. Then you don't know of any plant in connection with the pipe-line of which there has been such an air chamber installed or used, during the last five years, do you?

A. Not that I have seen myself.

Q. 191. None that you definitely know of.

A. None that I definitely know of.

Q. 192. There was no other power plant taking water from the flume or pipe-line of the Power Development Company plant?

A. Do you mean any company?

Q. 193. Any other plant.

A. Yes. I installed a wheel outside—about a 100 horse power compressor when they made the change from the flume to the tunnel.

Q. 194. When was that put on?

A. That was after the plant had run a couple of years or such a matter. They dispensed with the flume that they had and put in a tunnel, and the contractor on the tunnel—he didn't fail, but he was behind and they took away the contract from him and employed me to go down and put a compressor and power plant in, sufficient to drive the drill.

Q. 195. When was that work done?

A. I am not sure. I think it was about three years after the plant started.

Q. 196. After the Girard wheels were put in?

A. Yes, sir.

Q. 197. While the Girard wheels were attempting to operate no water was taken from the penstock or flume which supplied that Power Development Company plant for any other hydro-electric power plant, was there?

A. There was not.

Q. 198. Was not the water in the penstock and receiver slow and even in flow?

A. There was a volume of water going through it all the time.

Q. 199. Well, at a given water-gate opening, the flow was substantially even, was it not?

A. It was very even.

Q. 200. And the pressures were responsive even in the pipeline?

A. Very even.

Q. 201. Did the water-gates of the Girard wheels get stuck also, from time to time, so that they did not turn freely?

A. What do you mean, the hydraulic gates?

Q. 202. The gates to the wheel-buckets, or the nozzles as you would probably call them.

A. You mean the nozzles?

Q. 203. Yes.

A. No; I do not remember that they were stuck.

Q. 204. There were close fitting valves to those nozzles, were there not?

A. Yes, sir.

Q. 205. The close fit was substantially the same close fit as in the by-pass valve and casing? Was that not correct?

A. Well, there was quite a difference in the construction of the two.

Q. 206. But in each case it was a close working fit?

A. They had to be fairly close.

Q. 207. There was considerable repairing and experimental work done in that power house all the time you were there, wasn't there?

A. Well, I don't know about making repairs. There were not very many repairs nor very much experimental work. As originally put in there, when everything was eased up into working condition, it worked all right enough, but it would not develop the power called for.

Q. 208. And yet you did send to the Power Development Company's shop and the Bakersfield Iron Works shop in Bakersfield a number of times for various repair jobs to be done?

A. That was during the construction.

Q. 209. And the other repairs, such as fixing up the by-pass, were made right in the power house?

A. I filed the valves myself.

Q. 210. And when levers broke, and so forth, did you make new ones there?

A. No. They were sent down from the city. We had the patterns there and sent them right down.

Q. 211. From San Francisco.

A. From San Francisco.

Mr. Blakeslee: That is all.

REDIRECT EXAMINATION

By Mr. Westall:

Q. 212. Now, in regard to the Mammoth Bar installation which you have testified to, what success attended the operation of that plant?

Mr. Blakeslee: Objected to as calling for a conclusion and not the proper method of proof, not the best evidence and no foundation laid for the introduction of secondary evidence.

A. The plant was used every summer when they started up, and they ran five or six months, depending on the water in the river.

Q. 213. By Mr. Westall: Were you there and did you see it running?

Mr. Blakeslee: Objected to as calling for a conclusion.

A. Yes, sir.

Q. 214. By Mr. Westall: Describe in a general way the essential features of the installation at the Mammoth Bar as compared with that at Bakersfield, without going into details.

Mr. Blakeslee: Objected to as not redirect examination, not the proper method of proof, calling for secondary evidence and no foundation laid therefor, and as leading.

A. Practically the same, only the Mammoth Bar plant was a smaller plant. It operated under the same conditions with the same type of governor, the same type of the hydraulic control-valve and overtake, the same by-pass only in a smaller form than the other.

Q. 215. By Mr. Westall: And how successfully, if at all, did the by-pass and governor operate?

Mr. Blakeslee: The same objection, and as calling for a conclusion on the part of the witness.

Q. 216. By Mr. Westall: That is to say, did you have any trouble with the operation of the by-pass there?

A. Not after we once got it adjusted.

Q. 217. And did it run right along in regular commercial service at the time you testified?

Mr. Blakeslee: The same objection.

A. I have not been there for a good many years. I can't tell you whether they are working or not now, but every year I was there they were working.

Q. 218. By Mr. Westall: What connection had you with the installation at the Mammoth Bar Mine, and what had you to do with the work there or with the installation?

Mr. Blakeslee: The same objection.

A. I was superintendent of the Electrical Engineering Company and the Girard Water Wheel

Company, which was practically the same thing, and Howard Davis, a friend of mine who was controlling the Mammoth Bar Mine,—he was a friend of mine and I sold him the apparatus, and Mr. Berry and I put it in operation.

Q. 219. By Mr. Westall: And you were personally present and it was done under your personal supervision?

Mr. Blakeslee: The same objection.

A. I was; yes, sir.

Q. 220. By Mr. Westall: Can you state about when it was installed and how long after it operated successfully to your definite knowledge?

Mr. Blakeslee: The same objection.

A. The best I can recollect was about '94 or '95, or somewhere along there. I know it was before the Bakersfield installation.

Q. 221. By Mr. Westall: And up to how long, to your knowledge, do you know that that was successfully operated in regular work?

Mr. Blakeslee: The same objection. It will be manifest that counsel is attempting to testify.

A. I was up at the plant I think about five years after it was first installed and looked over his plant. He wanted to make some little changes in the lighting of the Mammoth Bar, and also in some of the pumping apparatus and motors. He had a larger pump and wanted me to connect up two of the motors together and put on 50 horse power. I went up and went over the power plant five years, at least, after the first installation.

Q. 222. By Mr. Westall: And was the governor and by-pass installation working satisfactorily as installed at that time?

Mr. Blakeslee: The same objection, and as grossly leading.

A. It was.

Q. 223. By Mr. Westall: And with the governor in operation on the pipe-line, and the by-pass, and other parts which you have testified were in use there, did it maintain a constant flow of water in the pipe-line?

Mr. Blakeslee: The same objection.

A. It did.

Q. 224. By Mr. Westall: At a uniform pressure, as you testified to at Bakersfield?

Mr. Blakeslee: The same objection, and as calling for an impossible answer, in view of the testimony of the witness, inasmuch as the flow could not possibly be constant if the governor was operating at all.

Mr. Westall: I object to counsel giving his opinion as an expert in the case, as he is not properly qualified and has not been sworn as a witness.

Q. 225. You have testified that the pressure in the pipe-line was constant and that there was a uniform flow of water therein. You could observe those facts, could you not, by looking at the pressure gauge and also by noting the flow of water from the tailrace?

Mr. Blakeslee: The same objection, and as leading.

A. The pressure gauge would not give you any indication. The tailrace would show it, or the overflow at the head of the pipe-line would show you. It was practically constant.

Q. 226. By Mr. Westall: The pressure gauge would show any variation in the pressure in the pipe-line?

A. It would. If the by-pass and nozzle were not set properly, sudden change in load would show a variation on the pressure gauge.

Mr. Blakeslee: The same objection.

Q. 227. By Mr. Westall: But with the by-pass set properly, and the water-wheel gates set properly, did the pressure gauge show any extreme variations of pressure at the Mammoth Bar or Bakersfield, either?

Mr. Blakeslee: The same objection.

A. No; they did not. More particularly at the Bakersfield plant, because I remember of noticing very particularly the variation of the gauge when they were making tests and throwing on full load to three-quarter load to one-half load, and so on. The gauge stood very quiet. I remarked to Cobb that we had our balances good between the nozzles and the by-pass.

Q. 228. By Mr. Westall: And the governors in both plants were so arranged that when the by-pass opened under governor action, the main water-gate moved towards closing direction and the by-pass opened, operating inversely to each other? Is that correct?

Mr. Blakeslee: The same objection, and as putting words into the witness's mouth.

A. You have not stated the question properly.

Q. 229 By Mr. Westall: And the mechanism was so arranged that when the water-gate opened under governor action the by-pass moved inversely toward closing direction, and vice versa? Is that correct?

Mr. Blakeslee: The same objections and all of the previous objections are noted.

A. No; the main water-gate **has** no connection whatever with the by-pass or the contracting nozzles. The water-gate is the gate that shuts off all the water when you want to do repairs to any part of it, and the nozzle is one part and the by-pass is another part.

Q. 230. By Mr. Westall: I mean the controllable nozzles when I speak of the water-gate. When the controllable main nozzles for supplying water to the wheel were moved towards closing position the by-pass valve opened inversely, and when there was an opposite movement of the main nozzles in opening direction **the** by-pass valve acted to close, inversely to the operation of the main nozzles?

Mr. Blakeslee: All the objections noted heretofore are repeated.

A. Yes.

Q. 231. By Mr. Westall: And those inverse actions of the valve at the main nozzles and those at the by-pass valve were controlled by the governor? Is that true?

Mr. Blakeslee: The same objection.

A. That is correct.

Q. 232. By Mr. Westall: And this governor action was to maintain a constant speed of the water-wheel? That is, of the generator?

Mr. Blakeslee: All the same objections.

A. Yes. That is what the governor is for.

RECROSS EXAMINATION

By Mr. Blakeslee:

Q. 233. The Mammoth Bar plant you have spoken of was not an electric lighting plant, was it?

A. No; it was for power purposes.

Q. 234. It didn't make much difference, whether there was a variation in speed up there, did it?

A. No; not particularly.

Q. 235. You are not able to say what year you think that Mammoth Bar plant was installed, are you?

A. I do. I said about 1894 or 1895. That is my recollection.

Q. 236. You are sure it was not 1896, are you?

A. Well, all I can remember is that it was installed before the Bakersfield plant, and I can't give you the exact date.

Q. 237. And that governor, as you say— Before that plant?

A. Yes, sir.

Q. 238. Did you ever install or do you know of there ever having been installed another set of power apparatus and governing mechanism therefor sub-

stantially like that you have testified was put in at the Mammoth Bar Mine, or substantially like that you have testified to having put in at the Power Development Company, in the general features and combination and inter-relation of parts thereof?

A. No; I do not.

Q. 239. When did you last see the plant you have told about, of the Mammoth Bar Gold Mining Company?

A. I think it was in 1907 or 8, right along there. I was up at the plant then. The river was still too high and they hadn't started up, but I went over from Auburn with Mr. Howard Davis and his wife, and we went over the work he wanted done and I think we went to the power house to see something and I didn't bother with the wheel or look at it, but merely, I said "Is everything all right?" he said, "Yes; I have a Jap here that knows more about it than I do or more than you do."

Q. 240. When did you last inspect that plant in a general way?

A. That was a little while before the fire. About 1905, I think. I went up there and made some changes in the dynamo he had there for lighting.

Q. 241. Did you look over the general features of the installation at that time aside from the dynamos?

A. No; not the last time I was there. The plant was not in operation.

Q. 242. When was it that you looked over any governor parts there may have been there?

A. In 1905.

Q. 243. How thoroughly did you look over those parts?

A. Oh, just a little time with Davis. He would do the work himself on the ground, at my suggestion. I told him instead of bushing the holes to bore them out and put in new pins. There was a little lost motion and there was a variation, and it was due to the wearing of the pins.

Q. 244. Did you inspect ~~one~~^{the} water-control mechanism?

A. No; all it was, the motion in the pins that controlled the valves were worn in the by-pass and the nozzles, and there was a little too much lost motion and it didn't govern. And he said he was going to bore them out and bush them out. I told him to bore them out and put in new pins.

Q. 245. Did you examine the by-pass?

A. No; I didn't take it apart. I gave him my suggestions as to the cheapest way.

Q. 246. When did you last observe the attempted operation of what you have called the by-pass in the plant?

A. That was along about 1902 or 1903 or somewhere along there. That was the last time we had any trouble there. He got a stick of wood down into it and broke the lever, and there was trouble, and I went up there and looked the thing over. I said there was something the matter inside of the pipe and he wouldn't have it, and we finally took it apart and found a great big oak block, and we fixed it up and it was all right.

Q. 247. Was that the same kind of a valve that was used up in the Power Development Company plant?

A. It was the same type. It was not as large.

Q. 248. Did it stick with sand up there?

A. No, I don't know that we had any trouble with sand; we had a little bit at the start; we made some adjustments and a few things had to be done. When it started it was like all new plants; you don't get things just right when you put them up.

Q. 249. That must also be said when you are experimenting with new apparatus?

A. I don't consider that experimenting. In any piece of mechanism you have always got to adjust them.

Q. 250. How many levers did you break up there, as the one you said you broke leading to the by-pass.

A. I don't think I ever broke any up there.

Q. 251. Only the one you mentioned?

A. At Bakersfield the controlling mechanism was not strong enough to break the levers, and when they caught it would not go over.

Q. 252. Did that do any damage to the other parts of the plant?

A. No; it didn't hurt anything.

Q. 253. It stopped the governing apparatus?

A. Sure; it broke his pipe-line.

Q. 254. I see. It created such extreme pressure.

A. It was a sudden stop and it broke about 20 feet of pipe-line 50 feet back of the power house.

Q. 255. How much do you suppose that damage cost?

A. I don't know how much. He had Japs working there and he had a lot of pipes laying around, and it took a day or so to put it in.

Q. 256. The plant was shut down?

A. Yes, sir; it was only a few hours work putting it in. They were like a lot of ants around there.

Q. 257. It cost some money?

A. It didn't cost \$20.

Q. 258. He had pipe there?

A. Yes, sir.

Q. 259. He bought the pipe?

A. Yes, sir; there might have been \$20 worth of pipe there.

Q. 260. It was rather an inconvenience?

A. Yes, sir.

Q. 261. Did it flood the power house?

A. No. It was on the side of a hill; it went right into the ravine.

Q. 262. Was there a break of some 20 feet?

A. He took out about 20 feet.

Q. 263. How much time, altogether, have you spent at that Mammoth Bar plant?

A. I was there never more than one day at a time.

Q. 264. You never made any tests for efficiency?

A. No, sir.

REDIRECT EXAMINATION

By Mr. Westall:

Q. 265. Mr. Van Emon, referring to the articles

namely, article on page 85 in volume 4, No. 5 of the Journal of Electricity, and the succeeding pages to page 91, please state whether or not you ^{had} ever seen that article before, and if so, when, and state fully what you know about the original writing and publication of the article referred to.

Mr. Blakeslee: The same objection as previously noted as to this line of examination, and that it is leading, and assuming publication within the knowledge of the witness, and as assuming identity of this purported publication with anything else, and not the proper method of proof and that the witness is not qualified.

A. I read the proofs before they were printed and saw the cuts—the rough cuts—and made a few little suggestions to Mr. Low at that time.

Q. 266. By Mr. Westall: Who wrote the article?

A. I assume that Mr. Low wrote it. He showed it to me and we went over it. I don't remember the circumstances now.

Q. 267. Who was Mr. Low at that time?

Mr. Blakeslee: The same objection.

A. He was interested in the Journal of Electricity; he was supposed to be editor; he was the publisher, or supposed to be.

Q. 268. By Mr. Westall: Do you recognize the article to which you have referred as being the article of which you read the proofs at that time?

Mr. Blakeslee: The same objection.

A. Yes. The reason I remember that is because

in this picture here,—there are other pictures in which I am not in, which were as good pictures as this one, and I joshed him about it.

Q. 269. By Mr. Westall: Do you remember reading the article at the time it was published, and please state when you read it.

Mr. Blakeslee: The same objection, and particularly that it is not redirect examination.

A. That was after the plant was running. I am taken by surprise here.

Q. 270. By Mr. Westall: Do you know that it was published about the time you read the proof?

Mr. Blakeslee: The same objection and that it is leading.

A. It was published right after that maybe within a week or two.

Q. 271. By Mr. Westall: And could you state whether it was published in August, 1897, as shown at the top of the page there?

Mr. Blakeslee: All previous objections are repeated, and that it is leading.

A. That must be the time it was published.

Q. 272. By Mr. Westall: Do you know of your own knowledge that it was about that time—about August, 1897?

Mr. Blakeslee: The same objection, and that it is leading.

A. Yes, sir; it was not quite a year after the plant was started.

Q. 273. By Mr. Westall: Referring now to the article at page 109 entitled “Water Wheel Govern-

ment'' in volume 4, No. 6, under date of September, 1897, in Defendant's Exhibits Vols. 4 and 5 of the *Journal of Electricity*, I will ask you to state whether you ever saw that article, and what you know of the writing and publication of the article referred to.

Mr. Blakeslee: The same objection, and particularly that it is not redirect examination.

A. That was part of the first publication, but it was not all published at one time. They published part of it and afterwards published another part of it.

Q. 274. By Mr. Westall: And did you read the proofs of that?

Mr. Blakeslee: The same objection.

A. Oh, yes; it was all written up about the same time.

Q. 275. By Mr. Westall: And do you remember that it was published about the time or shortly after you read the proofs?

Mr. Blakeslee: All previous objections are repeated, and that it is leading.

A. Yes.

Q. 276. By Mr. Westall: I will ask you to state what the book that I have been referring to is.

Mr. Blakeslee: Objected to on all the previous grounds, and as calling for the conclusion of the witness, and particularly that it is not the proper method of proof, the witness not being qualified. The book, whatever it may be, speaks best for itself, at least in comparison with such testimony as this witness can give, in view of his lack of qualification.

A. The Journal of Electricity, it was called at that time.

Q. 277. By Mr. Westall: Were you a subscriber, or did you have occasion to examine numbers of the Journal of Electricity about the time you have been testifying about?

Mr. Blakeslee: All previous objections are repeated.

A. I was a subscriber for years from the first one he ever published.

Q. 278. By Mr. Westall: What kind of a publication was that considered among engineers, and how widely did it circulate, to your knowledge?

Mr. Blakeslee: All previous objections are repeated.

A. It did not have a very large circulation, but it was considered a good paper in those days.

Mr. Westall: I believe that is all.

May 8, 1914.—P. M.

S. L. Berry, recalled. Cross Examination resumed.

By Mr. Blakeslee:

Q. 803. To what Mr. Doble did you refer to yesterday when you referred to talking to Mr. Doble when I was out of the room?

A. Mr. W. A. Doble.

Q. 804. Is he present in the room at the present time?

A. He is.

Q. 805. Do you know what his business is?

Mr. Westall: Objected to as incompetent, irrelevant and not proper cross-examination.

A. I understand he is chief engineer of the Pelton Water Wheel Company.

Q. 806. By Mr. Blakeslee: Do you know what business he was in before he connected himself with that company, or what his business connection was before?

Mr. Westall: Objected to as entirely outside of the issue in this case and as not proper cross-examination, and counsel is warned that if he persists in this line of questioning he is making the witness his own.

A. I am under the impression that he was connected with the Abner Doble Company.

Q. 807. By Blakeslee: Where was that company located?

Mr. Westall: The same objection.

A. In San Francisco. Just exactly where, I cannot say.

Q. 808. By Mr. Blakeslee: What was its business?

A. As far as I know it was general iron work and manufacturing.

Q. 809. Did they manufacture water-wheels and water-wheel governors at any time?

Mr. Westall: The same objection.

A. I cannot say as to what they manufactured in particular, but they manufactured water-wheels.

Q. 810. By Mr. Blakeslee: Referring to Defendant's Exhibit Berry Blueprint No. 1, can you point out therein where the packing of what you call

the by-pass valve in the Power Development Company plant, was located?

A. Referring to Defendant's Exhibit Berry Blueprint No. 1, there is no packing shown in connection with the by-pass valve.

Q. 811. Where was the packing? At what point or points was the packing located which took care of this valve?

A. I don't remember this detail, but if there was such a packing it would be in connection with the stem 42, the moving parts of by-pass valve 41.

Q. 812. That valve was disposed in the path of the water which it was supposed to control so that when the valve was closed in its case and the water cut off, the pressure of the stream or column of water so cut off was directly taken by the valve? Is that not correct?

A. The passage of the water was prevented by the valve in its closed position.

Q. 813. That is not an answer. Kindly read the question again.

(The Examiner reads the question.)

A. When this by-pass valve was closed there was pressure on top of it due to the pressure in the main conduit.

Q. 814. And the valve in turning it its case so as to permit water to pass out had to turn subject to this pressure? Is that not correct?

A. From closed position it turned subject to a decrease in pressure until an open position, when there was much less but still some pressure on it.

Q. 815. And to start such opening movement of the valve the valve was subject to full pressure?

A. When starting from full closed position it was subject to full pressure.

Q. 816. And subject to frictional retardation or frictional opposition in proportion to the superficial area of the valve and of the inner wall of the casing, which surfaces co-engaged? Is that not correct?

A. That is not quite correct. It was subject to pressure in proportion to the outlet area?

Q. 817. Well, at the initiation of the opening action, that would be the ratio, would it not?

A. At the initiation of opening action this valve would be subject to pressure in proportion with the area of the outlet opening.

Q. 818. What was the area of the outlet opening in this installation in proportion to the area of the valve surfaces, and as near as possible, give me that in square inches.

A. I have no recollection of the area of this in square inches.

Q. 819. Have you any other way of computing that from Berry Blueprint No. 1 or any other data?

A. I have no data covering that at the present time.

Q. 820. Can you tell how big that by-pass was—how long it was, what its diameter was, and what size its opening was?

A. I have no particular recollection on those points.

Q. 821. Do you know what the size of the connection was?

A. I do not.

Q. 822. Do you know what the cubical contents of the opening in the valve was?

A. I do not.

Q. 823. Now, at all times, in the movement or rotation of this alleged by-pass valve, portion of the periphery, or outer surface of the valve, were in frictional engagement with the inner surfaces of the valve case; is that not correct?

A. Not necessarily. The support might have been on the supporting stems. This question would depend upon which supporting surface came into connection first on a downward pressure. .

Q. 824. Then if those surfaces were not in contact, there would be leakage around the valve?

A. There would be leakage to the extent of lack of contact.

Q. 825. Did that valve leak up there?

A. That I could not say with certainty, as the discharge was to the tailrace and out of sight. I do not remember having investigated that point when the valve was closed.

Q. 826. That valve was designed to have a close working fit in its case?

A. The question of the fit of that valve was determined from the conditions which were assumed to exist in the plant. In all such mechanism such determination is subject to modification on installation.

Q. 827. Was not that valve dressed down on its body portion one or more times?

A. If you refer to ~~immediately~~ after installation,

I cannot answer as I did not dress it down myself and do not remember that I was present at any time when it was dressed down.

Q. 828. Was it dressed down before installation?

A. It was finished in the shop.

Q. 829. Did you see it before it was shipped to the Power Development Company plant?

A. I did.

Q. 830. What kind of a working fit did it have in its action?

A. I can't answer that because I did not measure the parts.

Q. 831. Did you rotate the valve in its case?

A. I cannot say that I did.

Q. 832. You did not give any final test as to the fit or play?

A. I do not remember that I so tested. That work was under the shop force, in particular.

Q. 833. Assuming that such valve did not leak, its normal fit in its case would be such that its periphery would be in frictional engagement with the inner walls of the case? Is that not correct?

A. That would be required to prevent leakage.

Q. 834. That would be required to some extent with a valve in any position, would it not?

A. Assuming close fitting, it would be in contact all the time.

Q. 835. That is not true of the valve in the needle type, such as the water-gate nozzle needle and

the by-pass nozzle needle of Complainant's Exhibits E to L, and the allied exhibits?

A. It is most certainly the case on the stems connected with these valves.

Q. 836. Exactly. But not on the members of the valves which actually close or open the nozzles; is that not correct?

A. This condition does not obtain at the point where the closure finally takes place.

Q. 837. Nor does it occur in the Lyndon patent in suit with respect to the surfaces of the butterfly valve which contact and seat? Is that not correct?

A. It occurs in the butterfly valve in the Lyndon patent ^{near} ~~on~~ the stem and ^{on} ~~near~~ the stem.

Q. 838. Exactly. But not on the valve body, does it?

A. It occurs on the valve body near the center of motion.

Q. 839. That is near the axis of the stem?

A. Near the axis of the stem.

Q. 840. But not on the sweep of the valve body around its periphery. Is that correct?

A. Not on the part having the greatest movement.

Q. 841. Nor on the part that passes the greatest amount of water?

A. No, sir; not on the part that passes the greatest amount of water.

Q. 842. Now, as a matter of fact, using the needle type of valve, when the valve is opened that part of the valve which shut off the water when the valve is closed is entirely away from its seat?

A. That must be the case in needle nozzles.

Q. 843. And therefore sand and other substances or water content which might jam such a valve as you have described as being present in the Power Development Company plant, would not jam and clog such a needle type of valve, nor would it clog a butterfly type of valve such as that of the Lyndon patent. Is that not correct?

A. In the case of the valve of the needle nozzle, sand in the water would wear the valve of the nozzle and would wear the stem at the point of contact with its supports. In the case of the butterfly valve shown in the Lyndon patent, this wear would take place at the stem, and on all parts of the valve, by means of the eddy actions set up.

Q. 844. That wearing, if anything, would tend to reduce the stock or material, wouldn't it?

A. That is its natural result. ,

Q. 845. And therefore it would allow more space for water to traverse, if anything?

A. To a slight extent.

Q. 846. And the more such wear took place the less damage there would be of jamming by sand and the like? Is that not correct?

A. The question of jamming by sand is not very intimately connected with this wear.

Q. 847. Referring to the exhibits, how many water-gates or water-wheel nozzles did you intend to illustrate in Defendant's Exhibit Berry Blueprint No. 1?

A. As shown on this drawing 7 as applying to the one wheel.

Q. 848. How many such nozzles were there on each of the wheels at the Power Development Company plant?

A. I can't say exactly. This is a diagrammatic drawing.

Q. 849. Were there as few as four?

A. My impression is that there were more than that.

Q. 850. Were there more than five that you know?

A. I cannot say.

Q. 851. In producing Berry Blueprint No. 1, I understand you to testify that you did not receive any inspiration or assistance from Mr. Edward S. Cobb. Now, in comparing this blueprint, and to assist you in so doing, did you have reference to volumes 4 and 5 of the Journal of Electricity which have been offered in evidence in this case?

A. I have testified that I saw those volumes.

Q. 852. How long before preparing Berry Blueprint No. 1 was it when you last looked over those volumes?

A. It was probably a month or probably three weeks.

Q. 853. Did you look over those volumes at all during the preparation of that blueprint or the tracing thereof?

A. I did not.

Q. 854. Can you point out in Defendant's Ex-

hibit XX where any power fluid is obtained to operate the hydraulic cylinder P?

A. Referring to Defendant's Exhibit XX I see no pipe supplying such power fluid. It had probably been removed at the time this photograph was taken.

Q. 855. Why would it be so removed, from your knowledge of the plant?

A. I cannot say.

Q. 856. That photograph, if it is a photograph or photographic reproduction, does not show what would be an operative structure then, does it?

A. To that extent it would not be operative.

Q. 857. How long a period of time were those pipes supplying power fluid removed from that plant to your knowledge?

A. I cannot say.

Q. 858. Do you remember their being removed?

A. I do not.

Q. 859. Referring to Defendant's Exhibit Journal of Electricity, Vols. 4 and 5, do you find any supply pipes for any power fluid to any cylinder shown in this picture?

A. To which picture do you refer?

Q. 860. At the top of page 110, volume 4, No. 6.

A. Referring to the upper picture of page 110, volume 4, No. 6, Journal of Electricity, I see no pipe supplying pressure fluid to the hydraulic cylinder,

Q. 861. Does the testimony you have just given as to Defendant's Exhibit XX apply equally to this cut under discussion?

A. The testimony given is the same in both cases.

Q. 862. Can you say what that Defendant's Exhibit XX and the cut in the Journal of Electricity which you have just discussed show?

A. I recognize the machinery shown in Defendant's Exhibit XX and in the cut on page 110, volume 4, No. 6, Journal of Electricity, as showing the machinery built by the Girard Water Wheel Company for the Power Development Company.

Q. 863. The same Power Development Company installation that you have referred to previously?

A. It is the installation before referred to.

Q. 864. Referring to Berry Blueprint No. 1, what could be the operation of the mechanism shown therein with the rod 17 projected through the wheel casing B as indicated in dotted lines and positioned radially from the center of the shaft 8, to a lesser distance than the outer portions of the wheel purported to be shown therein?

A. The drawing does not show any such condition. The distance shown in the elevation figure 3 is the vertical distance of this rod below the center line of the shaft, and in figure 2 this rod is shown as off center sufficiently to clear the wheel.

Q. 865. Then it did not run vertically directly under the shaft 8? That is, in the same vertical plane of the shaft 8?

A. I do not remember this detail in particular. This drawing is diagrammatic and was so entered.

Q. 866. Do you know which one of the levers

purported to be shown in this blueprint broke at the Bakersfield Power Development Company plant?

A. I do not.

Q. 867. Referring to Complainant's Exhibit Lyndon patent in suit, is there any electrical feature shown therein which in its performance does not resultantly produce mechanical action?

A. The question is indefinite, and I can only answer that by going far enough. Mechanical action can be found in all cases of application of electrical energy in the devices shown in this patent.

Q. 868. Taking the whole disclosure of the Lyndon patent in suit under consideration collectively, for the moment, the ultimate object of the inter-relation and inter-operation of the several parts, features, electrical and mechanical, there disclosed, is the operation mechanically of the water-wheel gate or gates and of the by-pass valve. Is that correct?

A. Taking the device shown in the Lyndon patent, the ultimate object is certainly the operation of the main water-wheel gates and by-pass valve by mechanical means, controlled through electrical means.

Q. 869. And you have at places mechanical means interposed between electrical means in this disclosure, have you not?

A. There is a mixture of mechanical and electrical means.

Q. 870. Please state if all the parts I now mention are not purely mechanical in this disclosure, to-wit: shaft 6, the shaft 12, shaft 20, the sheave parts

54 57 58, the gears 21a and 21, the shaft 21b, the levers 24 26 43 and the bell-crank 42, 14 and 61, the worm 18 and the worm-wheel 19, the clutch-members 22 and 23, the pulley 7, the mitre-gears 4, 5, 9, 10, 11, the springs 29 29, 28, 27, 37, and 38, the armatures in the respect that they are fixed to certain of the levers mentioned, being armatures 17, 31 and 63, the link 36, the pins 73 and the circuit breaker 74 actuated thereby, the rope transmission 51 52 and parts of sheave 54 cooperating therewith, the tappets and traveler on the shaft 20, being the parts 76 and 77 and connected device, and the turnbuckles in the ropes 51 and 52 shown at figure 5, together with the weights 70 and the dashpot 69. Is not every one of these features or moving parts entering into or assisting the governing operation of the disclosure of this patent?

A. Checking over the list of parts just given, I find that they may be considered mechanical when not in action, but as participating or moving parts they are not mechanical, inasmuch as the armatures 17, 31 and 63 become electrical in such participation, and part 69 is not a moving part.

Q. 871. The armatures 31, 63 and 17 are not electrical but rather subject to magnetic attraction or control. Is that not correct?

A. Magnetism in this case is the result of electrical action.

Q. 872. However, the armatures respond, of course, to magnetic pull, as far as known?

A. The armatures respond to the magnetic attraction resulting from electrical currents.

Q. 873. In effect is there any difference in so far as the result produced by the pull of magnetism upon those armatures is concerned, and the resultant movements of the levers 24, 61 and 14 are concerned, whether those armatures are pulled or moved by magnetism or pulled or moved by links or air pressure or springs or weights, or forced by steam or forced by high air pressure or forced by expanding gases or heavy liquid pressure?

A. If the movement is the same in extent and force, the result will be the same. But the means will be entirely different.

Q. 874. And the means will be entirely different if such armatures are moved by weights on the one hand, links on the other, and springs on the other? Is that not correct?

A. That depends upon conditions. The connection between this movement in such cases and the origin of movements not being given.

Q. 875. All the immediate means causing the pull or actuation will be different in kind, will they not?

A. That will depend again upon circumstances. Comparisons of this kind are impossible in a general sense.

Q. 876. Would you prefer to have the question take into account the prime mover in each case?

A. That will depend on the intent of the question.

Q. 877. Would variation in the nature of the prime mover make a difference in considering the

question whether there is an identity of actuating means?

A. The question is entirely too general in its scope to be answered.

Q. 878. Isn't that a fair question to put to an engineer?

A. I do not consider it so. There is no limit to it, whatever.

Q. 879. Couldn't you answer such a question as that under examination for mechanical engineering competence?

A. I do not see how I could answer such a broad, indefinite question.

Q. 880. Well, assume then that we have three armatures 17, identical in mounting, mass and shape, environment and limitations in general, and one of them is electromagnetically actuated, the second is actuated by links, and the third is actuated by compressed air, and the electromagnetic supply and the compressed air supply and the link actuation are all produced from energy taken from a mechanically operated shaft. Under that set of circumstances will you please tell me whether you would consider there was identity of means as between the group of parts including the compressed air, the group of parts including the links, and the group of parts including the electromagnetic means, and, if not, as between which of said groups, if any.

A. I would not consider that the means were identical in any of these cases, one with the other.

Q. 881. Would you consider either such means

to be mechanically the equivalent of either of the other means?

A. I would not. The parts mentioned do not make a complete operating mechanism.

Q. 882. Where is there any failure of completeness or what would you like to have added?

A. There are no parts connecting the various physical parts with the source of energy.

Q. 883. My question contemplated energy production for each of these directly acting devices, and I leave that open without specification. Now, can you say whether there is any identity or equivalence as between any of these groups of features?

Mr. Westall: These questions are objected to on the ground that it is calling upon the witness to perform what is clearly a judicial function, namely, to state whether a body of elements is a mechanical equivalent of another body, without giving the witness any idea as to the device in which the elements are embodied, and without giving any ideas as to the use, purposes and functions of the device inquired about. The question of mechanical equivalence depends entirely upon the circumstances of the particular case, and the attempt is merely to compel the witness to perform a judicial function.

Mr. Blakeslee: The defendant's counsel has opened the door to this line of inquiry, as the record shows.

A. The omission of the parts which have been omitted make it impossible to consider this question

completely. As far as disclosed, I would not consider the means identical.

Q. 884. By Mr. Blakeslee: Now, supposing we substitute a weight for compressed air. Would your answer be the same?

A. The answer would necessarily be the same.

Q. 885. Now, suppose we leave the weight substituted for the compressed air in the case put, and substitute a spring for the links. Would your answer still be the same?

A. As I understand this combination as it now stands, it is between the magnetic means, the weight and the spring?

Q. 886. Exactly.

A. The answer would necessarily be the same, for the reason given that the whole mechanism is not shown.

Q. 887. You ~~could~~ ^{could} construct three working groups of parts from the data given you in my recently given questions?

A. I could not.

Q. 888. You would not be able to set into motion from a prime mover the compressed-air-producing means, means to compress a spring, and means to trip a weight required in the last proposition?

A. The comparison is becoming very indefinite, in that the operation of these parts is so different in certain particulars that it is extremely difficult to carry out the idea. Magnetic action when it ceases, the result ceases. In the case of a weight action, the gravity thereon is inherent.

Q. 889. You would consider these questions insurmountable problems in the proposition that I put?

A. As the question is put I cannot see that I can carry out the idea without further explanation of what is desired.

Q. 890. Well, let us take a concrete example right directly in the case and the evidence. Let us suppose we have three installations set up just like that pictured in figure 1 of the Lyndon patent in suit, with the following differences: Installation No. 1 will be like that of the patent figure. Installation No. 2 will be identical, with the exception that a bell-crank with an armature will be interposed between the electromagnet 15 and the armature 17, the bell-crank being connected by a link at one arm of the armature 17 and carrying at the other arm the other armature which will be controlled by electromagnet 15. Case No. 3 will be the same, with the exception that another armature will be provided for the electromagnet 15 and a contractial or tension spring will be connected at one end thereof and at the other end of the armature 177. Now, will you please tell me whether there will be any mechanical equivalence in mode of operation and result produced and means of producing these results, to effect the oscillation of the arm 14, as between the three cases put.

A. Considering these three cases, I find absolutely no question of mechanical equivalence, inasmuch as the first condition given is the direct one, the other two simply introducing intermediate mechanism for performing the movement.

Q. 891. Can you produce for me a sketch of the three cases I have proposed, including merely the novel features introduced and none of the features of figure 1 of the patent in suit excepting electromagnet 15, the armature 17, and the lever 14?

, Mr. Westall: Counsel for defendant objects to the witness endeavoring to place an interpretation upon the vague and indefinite questions propounded by counsel, and insists that if counsel has any specific construction in mind that he cause to be made the sketch showing the construction to which he refers, and the witness is instructed that he need not produce any such sketch.

Mr. Blakeslee: The Court will take into consideration the reasons and ulterior purposes behind the instruction to the witness made, and that will have no effect upon our demand for an answer to this question in the form of such sketch, and the demand is repeated and the witness will be expected to submit such sketch, if not at the present time before he leaves the stand in this case; and it is further requested that in doing so he number the parts of the 3-sketch showing to be produced as far as he can in correspondence with the pertinent features of the disclosure of the drawing of the Lyndon patent in suit, and mark the sketch with his name and the present date. If witness omits to produce such sketch, it will be represented to the court, if we do not ask for an order to compel the production of such sketch, that the only construction to be placed upon such omission is that counsel fears the production, or that the witness cannot produce it.

Mr. Westall: The only thing that counsel fears is that counsel for complainant has such an indefinite idea in his head that he cannot himself produce such a sketch, and the witness is instructed that he need not pay any attention to the demand that has been made upon him unless directed to do so by the court.

Mr. Blakeslee: We call the attention of the court to the fact that the witness testified that he is a draughtsman, and a mechanical engineer, and in fact the witness has testified that he produced Berry Blueprint No. 1, and, therefore, that this is not an arduous task, and the witness has not stated that he does not understand the question.

Mr. Westall: Counsel for defendant suggests that if sketches are desired by complainant in this case that he may make the witness his own witness for the purpose, and employ him to perform those duties.

Q. 892. By Mr. Blakeslee: Now, do you understand me, Mr. Berry?

A. I would like to have the question read.

(The question containing the request of counsel is read to the witness by the Examiner.)

A. (Resuming) I cannot produce a sketch showing these conditions named under the conditions given that I shall omit in such sketches, as I understand it, the features 15, 17 and 14 of the Lyndon patent, inasmuch as such parts form the entire combination in the first combination given.

Q. 893. By Mr. Blakeslee: My request was

that you omit everything except the parts of the drawing mentioned.

(The question is re-read.)

A. I misunderstood you.

Q. 894. Now, do you want to change your answer?

A. As I now understand this question, I believe that I can produce such sketches, being provided with a written copy of the question.

Mr. Blakeslee: I will ask the Special Examiner to furnish you a written copy at the conclusion of this present session, and give you such time as you wish to produce the sketch prior to the termination of our testimony in this case.

Q. 895. In both the construction of the Lyndon patent in suit and Complainant's Exhibits E to L, and the allied exhibits such as Complainant's Exhibits KK and KKK, and ZZ, and U, and V, is not in each instance the governing action and the resultant movement or movements of the water-wheel gates or nozzle needles and of the by-pass valves or by-pass needles or auxiliary nozzle needles untimately responsive, produced by energy imparted or caused to be imparted under control of the moving speed-sensitive device actuated by power from the water-wheel shaft?

A. Such combinations of means and results are accomplished in defendant's device as shown in the exhibits mentioned and intended to be accomplished by the device shown in the Lyndon patent.

Q. 896. Then as long as the necessary operative

connections between or among these features are maintained, and the wheel-shaft turns, the governor features will be operative in each instance? Is that not correct?

A. There is no doubt but that the defendant's device as shown in the exhibits mentioned will be operative when the water-wheel shaft is turning and the parts are maintained in proper condition. But as I have already testified, there will not be such an operative condition in the device shown in the Lyndon patent.

Q. 897. It will also be true as to those features shown in the Lyndon patent, assuming that the same is ~~in~~^{an} operative construction as intended to be, in accordance with the object set forth in the specification of the Lyndon patent in suit? Is that not correct?

A. I cannot interpret Mr. Lyndon's intention except by what he has disclosed in his patent. But making an assumption which I have testified is impossible, there would be some result. Just what, I cannot predict, with my understanding of this device.

Q. 898. Can you point out in the disclosure of the Lyndon patent drawing and specifications any single or any number of single features which in themselves are inoperative as electrical or mechanical devices?

A. Taking the various elements disclosed in the Lyndon patent and confining them strictly within themselves, they will operate with greater or less

perfection, depending upon their construction.

Q. 899. There is not a single one of these parts or elements of the nature of dynamo, solenoid, electromagnet, levers, friction clutches, electrical circuits or paths, gears, springs, dashpots, turnbuckles, clutches, mercury contacts, pulleys, belt, and bearings, and the butterfly valve as such, rope transmission, water-gates as such, and electrical circuit-breakers as such, which was not fully known and the operation of which was not fully understood and which had not been employed in the wide range of service in the mechanical field, and which had not operated efficiently and reliably and which was not recognized as a successfully operating device and usable thing, prior to September 13, 1900? Is that not the case?

A. With the possible exception of the particular construction of dynamo 8, such parts were well-known at that time as operative under proper conditions.

Q. 900. That is true, is it not, of each and every one of the separate elements and parts disclosed in Defendant's Exhibit Wetmore Patent, in Defendant's Exhibit English Patent, in Defendant's Exhibit Lamb Patent, in Defendant's Exhibit Swiss Patent, and in Defendant's Exhibit French Patent, each with respect to the date at which the application for such patent was filed, with the showing of Cobb Blueprint No. 1 and Berry Blueprint No. 1, each with respect to the time when you have testified you designed the installation of the Power Development Company plant.

Mr. Westall: It is suggested that counsel for complainant hand the witness the exhibits referred to so that he may be able to testify with more certainty.

A. As far as my knowledge goes, and strictly limiting the element to its narrowest sense, I believe that these parts were well-known at the time of the dates of the various patents. This applies also to a device as shown on Cobb Blueprint No. 1 and Berry Blueprint No. 1 at the time when the drawings for this machinery were made by me under the superintendence of Mr. Van Emon.

Q. 901. By Mr. Blakeslee: There is not any single device or part, electrical or mechanical, of the Lyndon patent in suit, the construction and mode of operation of which is puzzling to you, is there?

A. Confining the scope of the question strictly to the narrowest elements involved, there are no parts shown the construction and operation of which is puzzling.

Q. 902. Now, if, as a constructing engineer, you received an order for a water-wheel governor, and attached to that order as specifications and drawings was a copy of the Lyndon patent in suit, and the price was satisfactory, would you hesitate to take the order to construct and deliver the apparatus, the dimensions of the parts being left to your choice, assuming the wheel under consideration to develop at full load 750 horse power?

A. I would not undertake such construction except with the very positive understanding that no

responsibility would attach to me as to the operation.

Q. 903. Would you take such an order and attempt to fill it, assuming the same conditions, excepting that a copy of Defendant's Exhibit English Patent were attached to the order as specifications and drawings?

A. While I would not consider the responsibility so great in this case, I would not accept the responsibility of its operation, as such an assumption of responsibility on the part of the engineer is unusual in mechanism not designed by him.

Q. 904. Now, assuming the same conditions of the next to the last question, and further assuming that a copy of Defendant's Exhibit Wetmore Patent were substituted as specifications and drawings and attached to the order, please answer the question.

A. I will make the same answer as in the case of the English patent, as to the relative responsibility applying to the Lyndon patent as before.

Q. 905. Would you guarantee the operativeness of such mechanism, including the structure of the English patent or the operativeness of such mechanism including the structure of the Wetmore patent?

A. Such guarantee of operativeness is not usual in engineering work, and I would not care to make it.

Q. 906. And that is the reason you would not guarantee it?

A. That is the only reason.

Q. 907. Do not electrical elevators operate positively and satisfactorily?

A. They do, to a greater or less extent, depending on design or construction.

Q. 908. Have you ever known of a telegraphic message failing to be delivered where the transmitting wires were in service?

A. I have no personal knowledge of this, but I can well imagine how it can be.

Q. 909. Did you ever in your personal experience have a telegraphic message not delivered where the wires were operative?

A. I cannot answer such question with certainty, for the reason that those not received might not come within my knowledge.

Q. 910. Did you ever know of one that was not received.

A. Not personally.

Q. 911. Is there not a type of automobile manufactured in which the transmission means are electrically operated?

A. I have no knowledge of such construction.

Q. 912. You know of such a construction in which the speed gears are shifted electrically, do you not?

A. I have heard of such devices.

Q. 913. In your work with the Electrical Engineering Company, what kind of electrical control apparatus came under your observation?

A. Electrical elevators especially. That type of elevator was at that time in process of development, and the Electrical Engineering Company took a prominent part in such work.

Q. 914. All of the principal features of the disclosures of Defendant's Exhibits Wetmore and English patents are electrically or ~~electromagnetically~~ controlled, or actuated, are they not?

A. The two patents mentioned involve in part electromagnetic means.

Q. 915. Neither mechanism would operate without the proper operation of the electromagnetic means, would it?

A. The omission of such parts would be fatal to the operation of the devices as shown.

Q. 916. Could not the mechanism of Defendant's Exhibit English Patent be operated by substituting some other means than the solenoid Z for moving the armature i?

A. Not within the disclosure of the patent.

Q. 917. Could the armature i and the contact points 3 and 4 be moved by something else than the solenoid Z so as to obtain the same order of movement?

A. They could be moved, but the question as to whether the result would be as shown is one that would have to be answered after considering the means adopted for that purpose.

Q. 918. You could rig up something to give the same motion to those parts as is given by the solenoid, could you not?

A. The question is indefinite in that it does not state the source of the energy for this work.

Q. 919. Well, supply your own ^{Source}~~means~~ of energy. Could you do so?

A. I could move such parts by hand.

Q. 920. Could you not move them mechanically?

A. They could be moved by mechanical means, but whether the result would be the same is a question which would depend upon the means which I have not in my mind worked out.

Q. 921. Is there anything singular and peculiar about the pull that a solenoid gives to an armature, referring to the pull itself, which distinguishes it from the pull given by some purely mechanical device?

A. The pull is of an entirely different nature, and it is extremely singular, inasmuch as there is nothing like it in nature.

Q. 922. Could you also distinguish as between the pull given an armature at the end at which the pull was given being concealed and the pull given a metallic body exactly like the armature the pull to which was given purely mechanical, and such means being likewise concealed?

A. If the movement of that end which is permitted to be seen is the same in nature, extent and force, I cannot see that there would be any way of distinguishing between the cases mentioned.

Q. 923. And that it would be possible that those pulls would be the same in nature, extent and force, would it not?

A. Hardly probable.

Q. 924. Then please tell me what it is that distinguishes these different kinds of pulls.

A. The question is an extremely indefinite one

to answer. The principal characteristic of the pull of a solenoid being determined solely by its construction.

Q. 925. Cannot you get the same resultant motion in a pull caused by the steam-actuated piston that you can in a pull caused by the solenoid?

A. It would be very difficult to produce exactly similar movements.

Q. 926. You could not phase them exactly the same?

A. It would be an extremely difficult thing to do.

Q. 927. Can you with a water-operated piston or a hydraulic ram?

A. The same remark applies. These things are by nature entirely different, and to control them exactly would be a matter of extreme difficulty, if not impossible.

Q. 928. Couldn't you make a chart of the rate of movement of the solenoid-pulled armature?

A. I could not. ,

Q. 929. That would be impossible, would it?

A. I so consider it. ,

Q. 930. Could you make a chart of the rate of movement of a cam-actuated armature? ,

A. Knowing the exact shape of the cam and the rate of revolution of that cam, and considering that it would be mounted on a shaft, such diagram could be made.

Q. 931. A solenoid and armature is only an electromagnet after all, isn't it?

A. It is a type of electromagnet.

Q. 932. And the electric motor is an electro-magnet, is it not?

A. I would regard an electric motor as in a different class.

Q. 933. Doesn't it involve the same principles of electro-magnetism?

A. It involves the use of electromagnets.

Q. 934. Electric elevators are operated by electric motors, are they not?

A. As a rule they are so operated.

Q. 935. And there are other elevators operated by water and by steam, are there not?

A. Yes, sir.

Q. 936. Can you distinguish between the rates of motion of these elevators without knowing their mode of operation?

A. The question does not apply to the discussion, inasmuch as this last reference is to a motion far removed from the electric parts.

Q. 937. But can you distinguish, nevertheless.

A. There are certain elements which tend to distinguish these various machines. As to the extent of the difference is a matter of particular construction.

Q. 938. Can you tell purely by the rate of initiation of movement or rate of cessation of movement of an elevator upon which you were riding, whether it is electrically, hydraulically, or steam operated?

A. Not in all cases.

Q. 939. Is not the electrical control system of electrical elevators, such as you have been familiar

with, more ramified and complicated and articulated as to its organization than that disclosed in the Lyndon patent in suit?

A. Some of the earlier elevators had a number of circuits which, however, were as a rule diversifications of one or more comparatively simple ideas.

Q. 940. Were not the electrical paths, relays and other branches and members of the transmission systems fully as complicated and ramified as these illustrated in the patent in suit?

A. The comparison is very difficult to make.

Q. 941. Well, generally speaking from the standpoint of the number of electromagnets, number of contact points and number of electrical paths.

A. I do not remember the exact details of the electric elevators under consideration.

Q. 942. When were you working upon electrical elevators last?

A. 1897.

Q. 943. A year after you made the drawings of the Power Development Company's plant?

A. Within a year after those drawings were made.

Q. 944. But you cannot remember those details, whereas you say you remember perfectly, as reflected in Berry Blueprint No. 1, the construction of that Power Development Company installation?

A. I have made no statement as to the exactness of my memory of the device shown in Berry Blueprint No. 1 as to particular details. Furthermore, I

was interested in that subject to a much greater extent than in electric elevators, and that particular installation was under consideration to a greater extent than any electric elevator with which I was acquainted at that time.

Q. 945. Didn't you work on the drawings of a number of electrical elevators in 1897?

A. As I remember it, I did. The details, however, differed.

Q. 946. And those electrical elevators were operative, were they not?

A. They were operative. However, the responsibility of the design of those elevators was with Mr. Van Emon.

Q. 947. Did you ever study a diagrammatic showing of a multiple control system of a train of electrically operated cars?

A. I have never made any particular study of such diagram.

Q. 948. You know that the brakes and the several motors are hooked up in multiples, do you not, and controlled from a single controller so that the proper relation exists between the several motors and their brakes?

A. I am not posted as to this class of work.

Q. 949. Did you ever hear of an electrical water-wheel governor known as the Lighthipe governor?

A. I have heard of such a governor in a general way.

Q. 950. When looking over volume 5, No. 4, of the Journal of Electricity, purported to have been

published September, 1897, I note therein an article entitled "Water Wheel Government," commencing on page 109 and on that page appearing what is purported to be a cut of the Lighthipe governor, front view. Did you ever see this cut before?

A. I have seen the cut mentioned.

Q. 951. Did you ever see the governors therein depicted?

A. I did not.

Q. 952. Never have seen one in use or on sale?

A. I have never seen such a governor either in use or on sale.

Q. 953. Did you ever know of one being operated?

A. I have heard of such a thing.

Q. 954. Among engineers is there a common knowledge of there having been a governor of this type available for use?

A. I cannot say.

Q. 955. Did you ever hear of the water-wheel governor known as the Replogle governor?

A. I have heard of such a governor.

Q. 956. Did you ever see one?

A. I have seen some of the ~~last~~ types.

Q. 957. When did you first see one?

A. I cannot recall when I first saw them.

Q. 958. Approximately how many years ago?

A. I cannot say. I have no distinct memory of having seen one of these governors.

Q. 959. Was it as long as ten years ago?

A. As I have forgotten when I first saw one I cannot say whether it was ten years or not.

Q. 960. Were you ever in the plant of the San Joaquin Electric Company near Fresno, California?

A. I was not.

Q. 961. That governor was an electrical governor, was it not?

A. I cannot say.

Q. 962. That is, the Replogle governor was electrical, was it not?

A. I understand it was electrical at one time.

Q. 963. And operated in response to a speed-sensitive device?

A. I am not posted as to the details, but I presume it must have been so to be a governor.

Q. 964. Specifically, is there any absence of correlation between or among the devices of the Lyndon patent in suit?

A. That absence of proper correlation of these parts which I consider renders this device absolutely inoperative is found between the action of the return device as shown, and the movement of the main water-wheel gates.

Q. 965. Now, before the return device, including the clutch parts 22 and 23, is operated at all, one of the magnets 15 and 16 must be energized and the clutch-gear 9, 10 and 11 thrown into operation to operate the shafts 12 and 20 which operate the water-gates and by-pass valves? Is that not correct?

A. Before the return device can be put into

operation through the clutches 22 and 23 there must be action on the part of either electromagnet 15 or electromagnet 16, throwing in action the lever 14, the clutch 13, and connecting either the gear 9 to 11, or 10 to 11, and thereby rotating shaft 12.

Q. 966. Now, the shaft 12 is supposed to rotate the shaft 20 and operate the water-gates and the by-pass valve, is it not?

A. The shaft 12 through the parts shown revolves the shaft 20 at a much slower speed, thereby moving the water-wheel gates through the gears to the shafts, except that such movement on the part of the shaft 12 does not operate the by-pass valve without the operation of other parts intended to connect the sheave 54 with the shaft 20.

Q. 967. Now, the rotation of the shaft 12 having been set up and the clutch members 22 and 23 being caused to co-engage, the clutch acts upon the lever 26 through a set of springs, does it not?

A. It so acts, through a set of springs and other necessary parts.

Q. 968. But the action of the clutch is modified by the springs and transmitted through the springs, is it not? In other words, there is a yielding transmission?

A. There is a yielding transmission.

Q. 969. Now, assuming the energization of solenoid 33 to be sufficiently powerful to prevent movement of the lever 26 by holding the core or armature 34, and thereby the lever 26, until the shaft 12 is materially rotated and rotated to such

an extent that the clutch 22 23 through the spring transmission finally overcomes the tenacity of the solenoid and the spring system in general operating upon the core, cannot the water-gates and the by-pass valve be operated before the returning device becomes powerful enough to restore the core or armature 34 of the solenoid to its normal position, breaking the respective contacts which free the shaft 12 from the shaft 6 or free the clutch 22 and 23 from the shaft 12, rotatively?

A. It is impossible to make the assumption named, inasmuch as the conditions demanded by the closely balanced system involving the core 34 and its springs preclude such extreme energization of solenoid 33. Furthermore, the possible movement on the part of the clutch 22 is limited to a very small arc and will therefore require a very small movement on the part of the shaft 12 to completely disengage the lever 26, and open the connections which have previously been made to energize one or the other of the electromagnets 15 or 16 and the electromagnet 32. The amount of movement on the part of the main water-wheel gates could not be more than a very little.

Q. 970. Until the main water-wheel gates and the by-pass valve inversely thereto have completed the necessary movements to return the speed of the wheel to normal, cannot a succession of such operations as defined, take place, resulting in a succession of rotated movements of the shaft 12 in the same direction, so that the step-by-step governing performance will ensue?

A. The great weights involved in the main water-wheel gates and by-pass valve and their immediate connections, contrasted with the light-weight and high speed of the parts involved in the returning mechanism, makes movement on the part of the former doubtful except under the very unlikely condition that there would be no spring and lost motion of parts. Furthermore, such a succession of movements at the high speed which would probably obtain would make this device, in the mind of an engineer, impractical of itself.

Q. 971. As to the weights, strengths and relations of mass and energy, is not that purely a question of degree in designing an apparatus following the disclosure of the Lyndon patent?

A. The answer was made in reference to the conditions usually found in such installations.

Q. 972. And as to the features of the governing mechanism, wouldn't it be manifest to any engineer that the proper strengths, powers and forces, and speeds, should be provided for in the governing apparatus in accordance with the work to be done?

A. We are considering this device as shown in the Lyndon patent and drawings, and not on the assumption that it is otherwise designed.

Q. 973. I am not speaking of a change of design, but merely changes in dimensions, weights, speeds, forces and powers, which do not contemplate any change in design whatsoever. Wouldn't they be by any capable engineer determined in accordance with the work to be done in governing?

A. The question of speed of the parts is inherent in the mechanism as shown, and I cannot separate that from the invention disclosed.

Q. 974. Is that the only objection you have to presupposing of an intermittent gate and by-pass movement as put in my last general question?

A. The reasons given in my answer previously covering this point go further than making changes in weights of the returning device.

Q. 975. You are not prepared to say, are you, that upon strong energization of the solenoid 33 a step-by-step movement in the same direction of the shaft 12 cannot take place?

A. The assumption of strong energization in the solenoid 33 is impossible, in view of the governing means provided. Furthermore, the provision of such a strong energization would affect the operation of the clutches 22 and 23 to a very small degree only.

Q. 976. Are you prepared to say that under some given energization of the solenoid 33 a step-by-step intermittent operation of the shaft 12 in rotation in one given direction cannot take place?

A. I cannot say that the degree of energization will affect the question beyond a very small extent.

Q. 977. Please reconsider the last question and see if you can answer it without differentiation as to that.

A. I would consider such intermittent movement as doubtful, even under the extreme assumption.

Q. 978. You are not prepared to say that it cannot take place, are you?

A. I am answering to the fullest extent of my knowledge. Whether it is absolutely impossible or not is difficult to answer.

Q. 979. The shaft 12 must necessarily operate before the returning device can operate at all, through the clutch 22 23. Is that not correct?

A. Such movement on the part of shaft 12 is necessary to a movement of the returning device.

Q. 980. And whenever the shaft 12 moves the shaft 20 must likewise move or rotate, must it not?

A. When the shaft 12 rotates to any extent there will be motion imparted to shaft 20.

Q. 981. And whenever the shaft 20 operates the water-wheel gates must be affected and move, must they not, and the by-pass also, with its clutch into shaft 20?

A. These parts must move on sufficient movement to the shaft 20.

Q. 982. And you are not prepared to say, are you, what would be sufficient movement? That is, what arc of rotation of the shaft 20?

A. I couldn't say just exactly what arc of motion would be required. It would depend upon the construction and the fit of the parts.

Q. 983. Those parts would move if there was any more movement of the shafts than necessary to pick up the lost motion of the gears on them? Is that not correct?

A. The amount of motion on the part of shaft 20 required to move the main water-wheel gate

and by-pass valve 48, would depend on the amount of said lost motion, the spring of the parts and the stretch of the ropes.

Q. 984. That is true of any transmission system?

A. That is true of any transmission system.

Q. 985. And the same applies to shaft 12 operating shaft 20 through the worm and worm-gear, does it not?

A. The same would apply to this movement.

Q. 986. Now, is this returning device proposition or subject the main troublesome question raised in your mind as to the operation of the features of the apparatus of Complainant's Exhibit Lyndon Patent in suit?

A. I consider it by far the most important lack of correlation which would prevent the operation of this mechanism as a satisfactory governor.

Q. 987. Can you point out any other in anywise fatal correlation?

A. I have already pointed out some disturbing features, such as the influence of springs 27 28 29 29 and the balance of the system, including the solenoid 34 and its spring 38. I would regard, however, the other lack of correlation as the important one.

Q. 988. Those features pertain really to the correlation of the members of the returning device, do they not?

A. The parts which I mentioned, namely, the springs 27 28 29 29, disturb the balance of the solenoid core 34 and spring 38 on any movement of

this part from its neutral position, the effect being different in each direction of movement.

Q. 989. Is there any correlation among the features of the elements of Defendant's Exhibit Wetmore Patent, or the device and elements of Defendant's Exhibit English Patent, which bothers you or puzzles you or seems to be vital to you in the operation of these devices?

A. I see no such lack of correlation in the parts shown in the Wetmore and the English patent which would bother me in this respect.

Q. 990. The clutch 22 23 is a friction clutch, is it not?

A. It is shown as a friction clutch.

Q. 991. The mercury cup contact device shown, particularly in figure 6 of the Complainant's Exhibit Lyndon Patent may be varied as to their operative condition by varying the amount of mercury in such cups to vary the depth of the mercury? Is that not correct?

A. That is correct.

Q. 992. The use of such mercury cups for contact devices in electrical apparatus was well-known prior to September 13, 1900, was it not?

A. It is my general impression that such contacts have been known for a long time.

Q. 993. And by varying the depth of the mercury in these cups the sequence of work, closings and breakings, in the Lyndon patent apparatus can be varied, can it not?

A. They can be so varied to a slight extent.

Q. 994. Dependent upon the depth of the mercury?

A. Dependent upon the depth of mercury.

Q. 995. The various springs of the system affecting the core of the solenoid 33 and the lever 26 will vary under compression and tension in accordance with the stresses put upon them in the operation of the Lyndon patent apparatus?

A. That is correct.

Q. 996. In Defendant's Exhibit Wetmore Patent there is no by-pass or relief valve shown, is there?

A. There is none shown.

Q. 997. In Defendant's Exhibit English Patent there is no by-pass or relief valve shown, is there?

A. There is nothing of the kind shown.

Q. 998. In part 15 of the Lyndon patent disclosure is an electromagnet in part controlling clutch-gear 9 10 11, is it not?

A. It is.

May 9, 1914. A. M.

*Ex. Berry recalled
cross examination
resumed
by Mr. Blakeslee*

Q. 999. In the construction of the Lyndon patent in suit, when a change of speed occurs in the operation of the dynamo 8, the core 34 of the solenoid 33 is caused to move, is it not?

A. Proper adjustment being had between the springs connecting the pull on the core 34 of the solenoid 33, changes in speed in dynamo 8 will cause movement of the core 34.

Q. 1000. And any movement of the core 34 will

~~will~~ be accompanied by the oscillations of the lever 26, is that not correct?

A. That is correct.

Q. 1001. You have heard the testimony of Mr. Van Emon in this case with respect to the by-pass testified to have been installed in the Power Development Company's plant near Bakersfield to the effect that he, with yourself, designed that installation, and that he suggested the by-pass. Are you quite sure that neither yourself and Mr. Van Emon jointly, nor Mr. Van Emon alone, filed any application for patents covering a combination or assemblage of features including the governing and governor parts of the installation?

A. There would be no occasion for the consideration of ^{the} application for patent on these devices as designed for the Bakersfield plant, inasmuch as this combination had been used previously, and any suggestions as to its use at Bakersfield would be dependent on that previous use, and not upon invention.

Q. 1002. What was the previous use you now refer to?

A. The previous use referred to was on the plant on the American River supplying power to the placer mine of the Mammoth Bar Gold Mining Company.

Q. 1003. Did you and Mr. Van Emon jointly design that installation last mentioned?

A. The hydraulic features were, as I now remember, jointly designed by us, but the suggestion to

use the by-pass valve to cure violent pressure changes in the pipe-line, was made by me after the first installation of the governor and water-wheel.

Q. 1004. Did either you or Mr. Van Emon or you and Mr. Van Emon jointly apply for any letters patent covering or attempting to cover any of the features of the installation which you say was made at the Mammoth Bar Gold Mining Company plant on the American River?

A. I cannot answer as to what Mr. Van Emon alone may have done or may not have done, but there was no such application for such patent on my part, or jointly with him.

Q. 1005. What features of that installation of the Mammoth Bar Gold Mining Company did Mr. Van Emon devise or suggest to your knowledge, independent of the joint designing of that installation?

Mr. Westall: I would like to note an objection to this line of questioning on the ground that it is not proper cross-examination. The questions are absolutely immaterial, incompetent and irrelevant. But I protest against filling the record with matters that can have no bearing upon the case, and which were not inquired of on direct examination.

Mr. Blakeslee: Counsel seems to think that he can keep from the court what he does not want the court to hear because he did not ask about it on direct examination. The court will be fully advised and will readily recognize the propriety of this cross-examination.

A. I have no definite knowledge at this time, but I would suppose that from his position and electrical knowledge that he had designed the electrical features.

Q. 1006. But none of the features disclosed in the Berry Blueprint No. 1 and Cobb Blueprint No. 1? Is that correct?

A. We, together, designed the features shown in Berry Blueprint and Cobb Blueprint No. 1.

Q. 1007. Then any application for any letters patent for the same would, in your opinion, have required joint procedure thereunto by yourself and Mr. Van Emon? Is that correct?

Mr. Westall: Objected to, unless counsel specifies what part of the mechanism was concerned.

A. As I have before stated, there would be no occasion for an application for patent on the features at the time they were designed for the Bakersfield plant, inasmuch as they were not new at that time.

Q. 1008. And as far as any of the features of the installation or purported installations of the Mammoth Bar Gold Mining Company were concerned, and in so far as any of those features may have resembled the disclosures of the Defendant's Exhibits Cobb Blueprint No. 1 and Berry Blueprint No. 1, it would have required joint procedure of yourself and Mr. Van Emon, would it, to have applied for any letters patent for the same?

A. I would not so consider it.

Q. 1009. And for what reasons?

A. For the reason that the suggestion as to the vital feature was made by me alone.

Q. 1010. Then, if any letters patent were to be applied for on anything which you considered was novel in that installation of the Mammoth Bar Gold Mining Company, and generally corresponding to anything disclosed in Berry Blueprint No. 1 or Cobb Blueprint No. 1, it would have required your sole and separate application for letters patent had there been a desire to patent the same? Is that correct?

Mr. Westall: Objected to as calling for an entire construction of the plant—anything that may have been included in the drawings. It may have included every bolt and screw therein. The question is evidently intended to mislead the witness. There might have been a dozen different patents granted on different parts of the mechanism, which have absolutely nothing to do with the present inquiry.

A. Without going into detailed features of the entire plant, answering as to the combination of load and speed-sensitive development of operating nozzles and reversely operating the by-pass valve, it is my opinion that application for patent on this particular feature would necessitate the sole application on my part. I cannot answer, however, what Mr. Van Emon's opinion is on the same subject.

Q. 1011. Then, as far as your conclusions, viewpoint and belief is concerned, nothing that entered into the installation of the Mammoth Bar Gold

Mining Company plant referred to, and which concerned the features which you have testified were there installed by you or by yourself and Mr. Van Emon jointly, irrespective of electrical features, could have been separately patented by Mr. Van Emon? Is that correct?

Mr. Westall: Objected to. How can the witness state whether a patent could be obtained by Mr. Van Emon or an application for anything he speaks of? The question evidently calls upon the witness to perform the functions of a patent office commissioner.

Q. 1012. Put in the word "properly"; properly applied for.

Mr. Westall: The amendment does not alter the objection, nor the unreasonableness of attempting to get the witness to perform the function of an examiner of the patent office.

A. I do not recall any such features now. The load and speed-sensitive elements had already been patented.

Q. 1013. By Mr. Blakeslee: Then I take it, that anything which was incorporated in that installation and which you at that time may have considered was novel with yourself or with yourself and Mr. Van Emon jointly, could not have been properly patented by Mr. Van Emon separately? Is that correct?

A. I cannot answer as to what subjects were considered at that time, but as far as the installation as made then, I do not recall any features

coming within the conditions given.

Q. 1014. That is, being properly separately patentable by Mr. Van Emon? Is that correct?

A. That, I believe, is correct.

Q. 1015. Now, referring to Defendant's Exhibit Wetmore patent, the same is generally for an electrical water-wheel governor, is it not?

A. The title of this patent is "Electrical Water-wheel governor."

Q. 1016. You find disclosed therein, do you not, a circuit-controlling solenoid device, the armature of which moves in a circuit-controlling action?

A. If you refer to the solenoid D and armature E, I find it.

Q. 1017. You find disclosed therein, do you not, a circuit-controlling solenoid device, the armature of which moves in a circuit-controlling action?

A. If you refer to the solenoid D and armature E, I find it.

Q. 1018. You find therein an electromagnetic shifting device, particularly solenoids I and I'?

A. I find such electromagnetic shifting devices.

Q. 1019. And you find therein a dynamo the current from which is utilized to energize the solenoids or one of same, do you not?

A. I find two such dynamos, differing somewhat in arrangement.

Q. 1020. Each of the same supplies current to energize one of the solenoids, does it not?

A. Each is so used.

Q. 1021. Likewise in that patent you find

clutch-gear which is controlled electromagnetically, do you not?

A. I find a mechanism performing that function.

Q. 1022. And the core J of the solenoids I and I' is an armature at the same time that it is a core?

A. The words indicate different elements. That is, differing in nature.

Q. 1023. Well, the core of a solenoid and the armature of an ordinary pole electromagnet are absolutely mechanically equivalent in results produced and method of producing such results? Is that not correct?

A. It is not altogether correct. They differ in nature of movement.

Q. 1024. Wouldn't you consider them mechanical equivalents as details for doing the same resultant work?

A. Provided they obtain the same movement.

Q. 1025. You find likewise in that Wetmore patent a speed-sensitive device operated by the water-wheel controlling an electrical circuit through contact device, do you not?

A. I find such speed-sensitive element in the drawings as an alternative method of performing functions of certain other parts which would be omitted in case this were used.

Q. 1026. Now, in this Wetmore patent, you therefore find, do you not, in kind, considering the dynamos shown therein as dynamos broadly and generically, and without reference to the particular organization of the

dynamo 8 of the Lyndon patent, each and every one of the electrical and electromagnetic devices disclosed in the Lyndon patent in suit? Is that not correct?

A. I find these elements in kind.

Q. 1027. Now, what is your conclusion, based upon the study of the Wetmore patent under discussion, in the preparation for your testimony given in this case and your study of this patent during giving such testimony, as to the operativeness of the subject of such Wetmore patent?

A. The question is indefinite in that it does not state to what extent it is meant, whether as to the detailed operation or final result.

Q. 1028. Well, state whether generally in your opinion as an engineer the results apparently aimed at by the inventor and patentee can be accomplished by utilizing the construction and inter-relation of parts and features disclosed in the Wetmore patent.

A. I consider that the device as shown in the Wetmore patent has a chance to succeed, but to what extent, I could not definitely state. It belongs to that border class wherein complete realization of the objects is a matter of determination partly by trial.

Q. 1029. Do you think the subject of this patent is sufficiently operative to entitle it to consideration in this case as having any bearing upon the issues involving the invalidity and validity of the Lyndon patent in suit?

A. I consider that the ideas described and shown are entitled to consideration.

Q. 1030. And as patents go, you have no reasons, have you, to condemn this Wetmore patent structure as

being in any particular or general sense an inoperative construction?

A. In a general sense I consider the ideas operative. As to whether certain details are as perfect as they should be, is open to discussion.

Q. 1031. Now, referring to Defendant's Exhibit English patent, we similarly find therein disclosed, do we not, a circuit maker and breaker, actuated by a solenoid through the core of the same, a core-shifting or motion-reversing device actuated through electromagnets, electromagnets in opposition and having a common armature, consisting of a lever pivoted between its ends and at one end in its motion performing the motion-reversing operation, and also a device acting upon the core of the mentioned solenoid tending to resist its movement. Is that not all correct?

A. That is correct, except the reference to the breaking device in the first part of your question.

Q. 1032. Well, we have two separate contact points 3 and 4 on the lever i, pivoted at 2, have we not?

A. We have.

Q. 1033. And when one of same is brought into contact the other is removed from contact. Is that not correct?

A. That does not describe the operation of this device, inasmuch as normally the other would have been open anyway.

Q. 1034. Well, when one of these contact devices is closed the other is open, is it not?

A. That is true.

Q. 1035. And then it might be preferable, from your

viewpoint, to substitute the words "two circuit makers" for the term "circuit maker and breaker." Is that better?

A. That is better, inasmuch as the breaking portion of this device is of vital importance in its operation.

Q. 1036. And the motion of the armature i will vary in accordance with the degree of energization of the solenoid Z. Is that not correct?

A. The movement of the core i will depend upon the net effect of the energizing necessary in the solenoid Z.

Q. 1037. And that operation of energization will accompany variation of speed dynamo from which energy is taken for energizing solenoid Z. Is that not correct?

A. That change in energization will follow changes of load and speed in the generator.

Q. 1038. Now, likewise, in Defendant's Exhibit English Patent, you find in kind, do you not, each and every one of the electrical and electromagnetic features disclosed in Complainant's Exhibit Lyndon patent in suit, without referring to the specific organization and mode of operation and effect of dynamo 8 of the Lyndon patent in suit?

A. Disregarding certain important functions, we find in kind the same class of elements.

Q. 1039. It would not require anything more than the simplest shop skill to modify the electrical and electromagnetic features of the English and Wetmore patents, to provide the electrical and electromagnetic devices of the Lyndon patent in suit, eliminating from consideration the specific organization and method of oper-

ation and operative effect of the dynamo 8 of the Lyndon patent in suit. Is that not correct?

A. As I understand the question, it resolves itself into whether or not the devices shown in the Lyndon patent as they are arranged could be used in the devices shown in the Wetmore and English patents. If I am right in this assumption an answer would require considerable consideration, so as to cover all the points involved.

Q. 1040. I am most certainly not inquiring as to the arrangement and inter-relation and combination of these electrical and electromagnetic parts and devices, but my inquiry is whether it would require anything more than ordinary shop skill to work over and adapt the electrical and electromagnetic features of the Wetmore patent and English patent so as to produce the several separate electrical and electromagnetic features of the Lyndon patent in suit, irrespective of the particular nature, organization, mode of operation and effect, of the dynamo 8 of the Lyndon patent in suit.

A. The question is too broad, and I will ask to have it made more specific.

Q. 1041. What is there about the question that is not understood or is vague?

A. The question is so broad and it covers so many issues that I would like to have it made specific so that I can understand just what is referred to.

Q. 1042. I do not think it is necessary to put a question as to every one of the electrical or electromagnetic features concerned. We have been through this subject in such manner that you have found in kind in the

English and Wetmore patents each of the electrical and electromagnetic features, apart from the specific organization, effect and mode of operation of the dynamo 8 of the Lyndon patent in suit, which is present in the disclosure of the Lyndon patent in suit. Now, as I understood your answers, they have admitted this resemblance in kind, and not specifically. I therefore wish to inquire whether it would require in your judgment as an engineer, anything more than mere workshop skill of an ordinary kind to adapt, alter or work over any one of these mentioned electrical or electromagnetic devices of the English and Wetmore patents, so that the requirements of the specific disclosures as to said electrical and electromagnetic devices of the Lyndon patent in suit would be satisfied, still eliminating from consideration the specific construction and organization and mode of operation and ~~effect~~^{ed} of the dynamo 8 of the Lyndon patent in suit, and, furthermore, not taking into account the inter-relation, combination and general assemblage and general effects and results and functions depending upon the combination of such parts and features shown in the Lyndon patent in suit.

A. Considering the elements found in these three patents strictly within themselves, omitting from consideration varying degrees of complexity, and especially omitting from consideration correlation of the various parts, I would consider these elements in themselves very much the same.

Q. 1043. There is no difficulty presented in the disclosure of the Lyndon patent in suit as to properly plotting the electrical paths and making electrical connec-

tions necessary to join up the various electrical and electromagnetic devices to obtain the mode of operation specified by the Lyndon patent in suit, and I am not asking you now as to the ultimate results, but merely the mode of operation.

A. There is no difficulty in tracing these electrical paths and determining what connections were intended by Mr. Lyndon and what movements he intended to accomplish.

Q. 1044. In the English patent you find, do you not, as to the particular mode of operations and relation of parts, a close analogy as between the specific lever and armature L thereof, and the lever and armature 14 of the Lyndon patent in suit, in each instance there being two electromagnets for oppositely swaying this lever, and in each instance the swaying of this lever producing a shifting of transmission parts to reverse direction of rotation of the shaft. Is that not correct?

A. The devices are practically correct.

Q. 1045. In this English patent the water-gate-operating shaft is always operatively connected with the driving shaft, as is the water-gate-operating shaft 20 of the Lyndon patent always operatively connected with the driving shaft 12. Is that not correct?

A. That is correct, meaning in the English patent shaft 8 is the driving shaft.

Q. 1046. Now, in Complainant's Exhibits E to L, the water-gate-operating shaft is always hooked up mechanically with the train of mechanism which drives it from the hydraulic cylinder to such installation. Is that not correct?

A. It is not exactly correct in the provided means of disconnecting.

Q. 1047. Well, there is no disconnection in the normal operation of the mechanism, is there?

A. There is no disconnection during normal operation.

Q. 1048. You do not find any dynamo wound and organized as the dynamo 8 of the Lyndon patent is specified to be, in either the English or Wetmore patents, do you?

A. There is no dynamo found in either the English or Wetmore patent and specifically described as being so wound.

Q. 1049. Are you particularly versed with the subject of field and armature winding of dynamos and motors?

A. In a general sense only, as I understand the general principles on which these machines are constructed.

Q. 1050. You never have supervised or done any such work, have you?

A. I have not.

Q. 1051. I believe you have testified that in neither the English nor Wetmore patents is disclosed a by-pass in any sense whatsoever, nor relief valve such as we have been discussing in this case.

A. Neither patent shows the hydraulic features mentioned.

Q. 1052. Now, do you find in either of these patents, that is, the English and Wetmore patents, assuming the solenoid Z in the English patent to be a controller of the water-gate-shifting means, and the solenoids D and D'

of the Wetmore patent to be a controller or controllers of the water-gate-shifting means, a returning device for the controller provided with actuating means controlled by said controller to return the controller to inoperative position.

A. The answer to this question depends on the definition of terms.

Q. 1053. Where I said "considering the solenoid", make that "considering the core of the solenoid Z in the English patent", and the "core of the solenoids D and D' of the Wetmore patent", to be the controller of the water-gate-shifting means.

A. I find in both of these patents a returning device, but not directly controlled by the controller.

Q. 1054. Then in the English and Wetmore patents, or English patent, is there a returning device controlled by the controller and operated by a clutch which, in turn is controlled by an electromagnet controlled by the controller.

A. I do not find any such specific elements in either of these patents.

Q. 1055. And consequently no such structures last stated with a circuit-closer controlling the energization of electro-magnets? Is that correct?

A. That is correct.

Q. 1056. You do not find in either the Defendant's Exhibit Swiss Patent or Defendant's Exhibit French Patent or Defendant's Exhibit Lamb Patent or Defendant's Exhibit Cobb Blueprint No. 1 or Defendant's Exhibit Berry Blueprint No. 1 a controller for shifting the water-gate-operating-means, or for shifting a by-pass

valve, provided with a returning device in turn provided with actuating means controlled by said controller to return the controller to inoperative position, do you?

A. I find a controller in all of these references made, except that in the Lamb patent it is mentioned but not shown. In the device shown in the Berry Blueprint No. 1 and Cobb Blueprint No. 1 such controller is found in the load and speed-sensitive element, and the returning device is inherent therein. In the French Patent and Swiss Patent the controller is returned by means of the movement of the water-gate-operating parts. The comparison is somewhat difficult to make, inasmuch as the means vary somewhat.

Q. 1057. Now, in any one of these exhibits mentioned in the last answer, (and as for Lamb there is nothing shown there, I take it, but a governor broadly) is the controller specified controlled by itself to return itself to inoperative position?

A. In the French and Swiss patents the controller is not returned inoperative condition by itself, but this may be said to be the case in the device shown in Berry Blueprint No. 1 and Cobb Blueprint No. 1. I have omitted the Lamb patent in this answer, for the reason that it does not specifically disclose the speed-sensitive element.

Q. 1058. Then I take it the conditions of the question under present consideration are not met in the Lamb, Swiss, French of Wetmore or English patents. Is that not correct?

A. That is my understanding.

Q. 1059. Now, considering Cobb Blueprint No. 1 and Berry Blueprint No. 1, is there any such returning

device disclosed therein and any such controller therein, which controller is provided with actuating means controlled by the controller to return the controller to inoperative position, independent of necessarily joint operation of the speed or load-sensitive device, and not directly subject to the action of the speed or load-sensitive device?

A. There is no separate and distinct part, separate from these functions of the load and speed-sensitive parts of the governor which attain this result, which can be said to correspond to the specific device described.

Q. 1060. Now, in Complainant's Exhibits E to L, and the allied complainant's exhibits referred to by you as auxiliary to such disclosures, such combination of parts and features is present. Is that not correct? In other words, cannot the returning device operate through the control of the controller by the controller to return the controller to inoperative position, without a necessary participation in such action by the fly-balls as the speed-sensitive device, the controller being considered as the piston valve in its casing which controls the admission of pressure fluid to the piston and cylinder which actuate the water-gate-operating shaft.

A. I will ask that the question be simplified so as to contain a definite question.

(The question is read.)

Q. 1061. That question as I have it is absolutely clear and limpid.

A. Answering the first part of this question as being clear, and definite, I will state that such combination is

not found in defendant's device as shown in the exhibits mentioned.

Q. 1062. Where is any element or feature in the question or statement or general proposition lacking?

A. The comparison fails inasmuch as in the defendant's device shown on the exhibit mentioned, the returning device is not controlled by the controller, the word being used as specified in the question to mean the balanced valve controlling the flow of pressure fluid to the cylinder.

Q. 1063. For the purposes of elimination, is that the only deficiency you can find in the showing, so that I may make such assumption in further questioning.

A. That is the vital difference, as I see it in the comparison.

Q. 1064. Very well. Now, in these exhibits the controller identified as returned to inoperative position through the action of the rack and pinion meshing with the rack and sliding on the same, in combination with the springs affecting the rack, through the dashpot of the adjustable valve, which adjustable valve is adjusted in movement of the dashpot, that dashpot being moved through the connections to the water-gate-operating shaft, and that water-gate-operating shaft being moved by the piston in the cylinder which is supplied by the working fluid under control of what we have called the controller. Is that statement of conditions and facts not correct?

A. That statement in its assumption is not entirely correct.

Q. 1065. Where is there any defect in it?

A. Inasmuch as all parts of this device are connected, there must be a cycle of operation. But the question of control in its nature and extent has not been touched upon in the question.

Q. 1066. Well, I am not considering the degree. But is it not true that that cycle is performed so that the controller is moved to inoperative position through that cycle consequent upon a movement of the controller to cause movement of the piston in the cylinder to which power fluid is admitted by the controller?

A. That is not necessarily the case, inasmuch as under certain conditions movement of the piston does not produce movement of the returning device.

Q. 1067. Well, does not that result occur in the performance of that cycle whenever the returning device operates?

A. It is certain that when the returning device operates it takes motion from the movement of the piston in the power cylinder.

Q. 1068. Then can you not answer the next preceding question in the affirmative?

A. My answer is affirmative in that respect, except as limited in my answer to that question.

Q. 1069. Well, then, your answer is in the affirmative, is it not, in this respect, whenever the returning device moves?

A. As I understand this question, it hinges entirely upon the definition of that word "control". If that simply means that movement of the piston follows movement of the balanced valve, that would be one condition which would not necessarily be the same in all cases, and which

would not describe to my mind the word "control" as applied to this mechanism.

Mr. Blakeslee: As we have been all over the question of the word "control", and have come down merely to the performance of a certain cycle, I will ask that the last answer be stricken out and withheld from consideration.

Q. 1070. I again ask the witness if the answer in which he stated he affirmatively answered was not given with the significance that that affirmative answer would stand as a part of the affirmative answer, assuming that the returning device operated in any given cycle including operation of the returning device, the piston valve, its connections with the controller, the cylinder supplied thereby and the piston therein, and the connections from that piston to the water-gate-operating shaft, and from the water-gate-operating shaft to the returning device.

Mr. Westall: Counsel for the defendant objects to useless repetitions of matters which have been gone over fully by the witness, and submits that the questions are so ambiguous and contain so many false assumptions, so many false and unnatural meanings of words, that it is impossible for such testimony to have any possible bearing on the case.

Mr. Blakeslee: It is submitted that the testimony of this witness can have a lesser value, as counsel insists, due to his apparent ignorance of the subject matter considered, by coaching the witness as to the nature of this inquiry. We propose to follow this inquiry, and its validity and propriety is apparent, and it is strictly and purely cross-examination and a proper method of proof.

A. As I understand the question referred to, it involves essentially and clearly the question of operation of the returning device under the control of the controller. My affirmative answer applied only to the fact that any movement on the part of the returning device would necessarily follow movement of the piston in the power cylinder, which piston moves after movement of the balanced valve which has been called the "controller" in this case, but that answer cannot be taken to mean that the response on the part of the returning device is to action of the said controller, inasmuch as it is to the nature of the movement of the water-gate-operating shaft, and somewhat to the extent of that movement.

Q. 1071. Now, such action of the returning device is to return the controller, or, we will say, the piston, to inoperative position, is it not?

A. That is the intention of the returning device.

Q. 1072. And that action is performed independent of complete control by the fly-balls, they being the speed-sensitive device, is it not?

A. If I understand it correctly, the question is as to whether this return of the balanced valve to neutral position would take place without movement on the part of the balls of the speed-sensitive element. If that be true, such return takes place.

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Q. 1073. Referring to Complainant's Exhibit London Patent in Suit, is there any doubt in your mind that the solenoid 33 is intended to be and under suitable conditions is energized variably by dynamo 8.

A. There is no doubt in my mind on that point. It is so energized.

St. Berry recalled cross examination resumed by Mr. Stahesler

Q. 1074. In similar respects, is there any doubt that the lever 26 is moved by the core 34 of the solenoid 33?

A. There is no doubt about that.

Q. 1075. Similarly, is there any doubt that the rod 36 is moved on the movement of the lever 26?

A. There is no doubt.

~~Q. 1075. Similarly, is there any doubt tha the rod 36 is moved on the movement of the lever 26?~~

~~A. There is no doubt.~~

Q. 1076. Or that the lever 43 is moved on the movement of rod 36?

A. There is no doubt.

Q. 1077. Or that the contacts are made or broken on movement of the lever 26 to energize or de-energize the electromagnets 15 or 16, as the case may be?

A. There is no doubt on that on sufficient movement of lever 26.

Q. 1078. Or that on sufficient movement of the lever 43 the proper contacts are made or broken to energize or de-energize the electromagnets 32 and 64.

A. There is no doubt on that point. Such is the intention.

Q. 1079. Or that upon rotation of shaft 6 the dynamo 8 is operated?

A. There is no doubt on that point.

Q. 1080. Or that upon energization of either magnets 15 or 16 the clutch-gear 9 10 and 11 is operated?

A. Yes, sir; such is the intention.

Q. 1081. Or that upon operation of such clutch-gear the shaft 12 is rotated in couple with the shaft 6?

A. That was the intention.

Q. 1082. Or that the shaft 12, when rotated, rotates the shaft 20?

A. It will so do on sufficient rotation.

Q. 1083. Or that upon energization of electromagnet 32 the clutch 22 23 is caused to operate?

A. There is no doubt upon that point.

Q. 1084. Or that upon operation of the clutch 22 23 the returning device acts upon the rod 26 to move or tend to move the same?

A. It will move it.

Q. 1085. Or that upon energization of electromagnet 64 the lever 61 will be operated tending to clutch the by-pass valve 48 through its stem 49 and the ropes 51 and 52 in couple with the shaft 20?

A. There is no question as to the intention of this patent being such.

Q. 1086. Or that when the shaft 20 rotates and such by-pass valve is clutched into couple with it the by-pass valve will be moved?

A. There is no question about that, with the limitations before made as to the amount of movement.

Q. 1087. Or that when the shaft 20 sufficiently moves the shaft 21b controlling the water-gates will move?

A. There is no question as to that.

Q. 1088. Or that the shaft 6 will be constantly rotated by the wheel-shaft 3?

A. There is no question ^{as to} ~~about~~ that.

Q. 1089. Or that when one of the pins 73 engages the circuit-breaker device 74 the circuit 105 will be broken?

A. Under proper arrangement of parts that would happen.

Q. 1090. Or that when the parts 76 77 upon the shaft 20 have sufficiently moved the circuit will be broken through the electromagnet 15 or 16?

A. That would be the case.

Q. 1091. Or that when the by-pass valve is unclutched from couple with the shaft 20 the weights 70 will tend to act upon the ropes 51 and 52 to return the by-pass valve to a certain position?

A. With a certain reservation as to the sufficiency of means, that would happen.

Q. 1092. By "sufficiency of means" I suppose you mean as to power?

A. By "sufficiency of means" I refer to the question of power and adaptability of the weights to this service.

Q. 1093. That is a matter of design, is it not?

A. Yes.

Q. 1094. All of these several elements just categorically considered are intended in accordance with the disclosure of the Lyndon patent in suit to cause the by-pass valve to operate inversely to the movement of the water-gates through power applied to the shaft 6 from the wheel-shaft, under the immediate control of solenoid 33 and its core 34, which is in turn controlled by the dynamo 8 operated sensitively as to speed in accordance with the rate of motion of the shaft 6 or of the water-wheel shaft 3, so as to cause the return of the by-pass valve to a certain position after it has been moved inversely with respect to the water-gate, so as to prevent the over-operation or excessive operation of the entire apparatus,

so as to prevent the general operation of the apparatus, if a tendency of the water-wheel-gates and the by-pass valve to become jammed should manifest itself in operation, and so as to confine to a definite degree the motion of the by-pass valve. Is that not a fair, general statement as to the operative objects of the apparatus, considered in accordance with the intentions of the disclosure of the Lyndon patent in suit?

A. This question has become so very broad and involves so many elements, that I will have to ask that it be read in a connected manner.

(The question is read.)

A. (Continuing.) This question is extremely general, is very uncertain in parts, and I therefore cannot answer it as fully as may be desired. But I will say that it is decidedly incorrect in that part where it states that these movements are directly controlled by the core 34 of the solenoid 33. The references as to the cause of the return of the by-pass valve to a certain position are very indefinite. There can be no doubt as to what intention Mr. Lyndon has disclosed in this patent, as he has clearly defined such intention.

Q. 1095. Is his manifest intention to attain operation as I have stated it in the last preceding question, with the reservation of your objections thereto concerning the control by the solenoid 33 and its core 34, and a return of the by-pass valve to a certain position?

A. My objection is not as to the control on the part of the core 34 of solenoid 33 and the generator, but as to the directness of this control. As to the other objects, there is no doubt as to Mr. Lyndon's intention in this re-

gard in the specification, the objection bearing particularly on the statement of the question referred to.

Q. 1096. Then the intention, eliminating for the present the control by the solenoid and its core, is substantially as specified in the statements of that question?

A. As far as I can answer such a general and indefinite question, and with the reservations made and others which may develop on closer examination, I would say that that would express the general intent of Mr. Lyndon's patent.

Q. 1097. Now, as to this proposition of the solenoid 33 and its core 34, none of the governing operations which we are now discussing pertinent to the by-pass and water-gates will take place at a constant energization potential, or unvarying energization potential of the solenoid 33? Is that not correct?

A. There would be no movement when the pull of solenoid 33 is balanced by the counteracting springs.

Q. 1098. And likewise not until a change in the strength of energization of the solenoid takes place. Is that not equally correct?

A. That is correct.

Q. 1099. In that sense, therefore, is not the solenoid 33 with its core the primary controller of this Lyndon apparatus subject to the domination of the speed-sensitive device, being dynamo 8?

Mr. Westall: Objected to as having been already fully covered in the witness's previous cross-examination.

A. I would not regard the solenoid 33 and its core 34 as a controller, it being an inseparable part of the dyna-

mo and its circuit, and being a device indicating the changes occurring in the dynamo.

Q. 1100. Does the solenoid 33 with its core 34 not control the governing apparatus under discussion in the sense that no governing action takes place without a movement of the core 34 in and responsive to change in pull of this solenoid 33?

A. Such movement of the core 34 of the solenoid 33 does not make it a controller. The same name and the same argument could be applied to any moving part involved.

Q. 1101. Is it not a controller in the sense that it does control the several governing actions?

A. It does not control the actions in itself; it is simply an element in the real controller.

Q. 1102. Are not those governing actions controlled through the movements of the core 34 of the solenoid 33?

A. The solenoid 33 and core 34 is one element through which this indication passes.

Mr. Blakeslee: I will ask that the answer be given to the question as put in the terms of the question.

(The question is read.)

A. I can say that such movements are controlled through the solenoid 33 and core 34, but not by them.

Q. 1103. You find, do you not, a close analogy between the controlling functions of this solenoid and its core responsive to the energization by the dynamo 8 and the controlling function of the balanced valve in Complainant's Exhibits E to L, inclusive, and the analogous exhibits of complainant under actuation, the

fly-balls of the speed-sensitive device associated therewith, the balanced valve referred to being the valve which controls the admission of pressure fluid to the solenoid and piston which causes, upon movement of the piston, movement of the water-gate-operating shaft, and movements of the returning device ?

A. I find no analogy whatever between those parts.

Q. 1104. Where is the analogy, to your mind, improper or wanting?

A. The analogy does not exist, for the reason that the movement of the core 34 is used to make certain contacts which control the flow of secondary current of electricity, and there is no function performed by the core 34 in any way analogous to that performed by the balanced valve in Defendant's device which directly controls the flow of energy by means of which the water-gate-operating shaft is moved.

Q. 1105. Your chief objection to the admission of such analogy consists in the distinction between an electrical or electromagnetic result, and a mechanical result; is that not correct?

A. It does not consist entirely in that, by any means.

Q. 1106. In what else does it consist?

Mr. Westall: Objected to. The question has already been fully answered by the witness.

A. As I have already stated, the objection rests in the fact that movement of the core 34 of the solenoid 33 is simply an indication of the speed-sensitive controller. For this indication to be utilized it is necessary that other parts be introduced and used.

Q. 1107. By Br. Blakeslee: Is not the movement of

the balanced valve in Complainant's exhibit under discussion an indication of change in condition of the speed sensitive device or fly-balls?

A. Any movement on the part of any part of the mechanism could be so considered, also.

Q. 1108. Is the question I put not a correct statement?

A. The statement that you have put is not a correct statement and it is not complete. It is no more correct than it would be if applied to the movements of any other part of the mechanism.

Q. 1109. I am not asking how correct it is comparatively, but is it not correct taken by itself?

A. It is not correct in that it is not complete.

Q. 1110. Is any changes of position of the fly-balls indicated by the change of position of the balanced valve?

Mr. Westall: Objected to as being almost identically the same question that has been answered by the witness before, and being mere repetition.

A. Anyone desiring an indication of the movements of the fly-balls for that purpose only, would not look to the valve movement, but to some visible portion of the device.

Q. 1111. The stem of the balanced valve would indicate such fly-ball disturbances, would it not?

A. The stem of the fly-ball governor could be so used, and as such, could be considered as analagous to the core 34 of the solenoid 33.

Q. 1112. And that stem moves absolutely in step with the balanced valve, does it not?

A. It so moves.

Q. 1113. And likewise, are not other parts introduced between the balanced valve and the water-gate-operating shaft in said complainant's exhibits to produce motion of the water-gate-operating shaft?

A. Other parts are utilized in this movement, but the control of energy producing this movement is made by the balanced valve directly.

Q. 1114. The balanced valve only controls the application of energy which has passed through the cylinder valve? Is that not correct?

A. The balanced valve determines the direction which this energy shall take.

Q. 1115. And the work it shall do?

A. And the work it shall do.

Q. 1116. And the movement of the core 34 of the solenoid 33 determines, does it not, what work energy from the dynamo 8 shall perform?

A. It determines the disposition of energy from dynamo 8.

Q. 1117. There is no reference in the Lyndon patent in suit to the solenoid 33 and its core as a mere indicating device, is there?

A. I do not recall that he has so named it. That, however, does not change its function.

Q. 1118. Now, as a matter of fact, no governing action takes place in the disclosure of the Lyndon patent in suit without movement of the core 34; and likewise, no governing action in the said complainant's exhibits takes place without movement of the balanced valve con-

trolling the application of power fluid to the piston. Is that not correct?

A. That statement is correct, but it is not parallel in the two parts, inasmuch as the same remark could be applied to any other parts moving.

Q. 1119. But no movement can take place in any other parts of the governing apparatus in either direction, until such specified movement of such specified parts takes place consequent upon variation in the condition of the speed-sensitive device, being dynamo 8, or the fly-balls? Is that not correct?

A. The statement is correct, but the comparison is not a parallel one.

Q. 1120. I will have to ask that the last part of the answer, following the words "The statement is correct", be stricken from the record and withheld from consideration as not responsive. None of the discrepancies which you have found in numbers, figures, and like typographical errors in the Lyndon patent disclosure, prevented your understanding the intent and proper disclosure, did they?

A. They simply delayed the final result, and occasioned more labor in undertaking ^{standing} the patent; but a final understanding was arrived at.

Q. 1121. Complainant's Exhibit C is a fair showing of the general construction and inter-relation of the disclosure of the Lyndon patent in suit, is it not?

A. I would consider it a fair disclosure and a much preferable one to the one in the Lyndon patent.

Q. 1122. In the apparatus attempted to be shown in this Exhibit Berry Blueprint No. 1 and Defendant's Ex-

hibit Cobb Blueprint No. 1, no means is indicated or intended to be indicated to cause or permit movement of the by-pass valve or relief valve independently of movement of the water-wheel nozzles or gates so that the by-pass valve can move to a certain position after a governing action has taken place. Is that not correct?

A. It is not altogether correct. Provision for directly re-stationing this by-pass valve after governing action resides in the governor itself.

Q. 1123. But such re-stationing cannot take place independent of movement of the water-wheel nozzles or valves?

A. There is no independent movement of the by-pass valve without movement of the main gates.

Q. 1124. What was the deflector you have testified about as used at the Power Development Company plant?

A. There was no deflector, as that word is ordinarily used, installed with the Girard wheels in that plant. The deflectors were used in connection, as I understand it, with the Tuthill wheels, which immediately followed the Girard wheels.

Q. 1125. Did you have anything to do with the installation of those Tuthill wheels?

A. Nothing at all.

Q. 1126. Have you, and can you produce any drawing or showing of the installation of these Tuthill wheels at the Power Development Company plant?

A. I have a blueprint showing these wheels.

Q. 1127. Does the blueprint show any governing connections of the wheels?

A. It does not show any of the governing parts in themselves, but it shows connecting means by which the deflecting plates could be operated.

Q. 1128. It does not show any provision for operating the by-pass valve or any by-pass valve at all, does it?

A. There is no such provision, inasmuch as the use of these deflecting plates would make entirely unnecessary and undesirable any additional by-pass.

Q. 1129. Since the date of installation of the Power Development Company plant, aside from that plant, you have never seen a dynamometer or speed-load-sensitive device, such as that you say was installed in connection with the Girard wheels there installed, in connection with any other water power plant, have you, and for the purpose of using it as a governor or governor element?

A. I do not remember having seen such a device since that time.

Q. 1130. You do not know of any such device having been used since then?

A. I don't know of any such device.

Q. 1131. In any other plant?

A. I don't know of any such device being used in any other plant since that time.

Q. 1132. How many times were you at the plant of the Mammoth Bar Gold Mining Company, which you have testified to be on the American river?

A. I was there once or twice. I am not quite certain. It has been a number of years since I was there.

Q. 1133. When were you there?

A. I cannot fix the date.

Q. 1134. Was it before the year 1900?

A. It was.

Q. 1135. How many days were you there?

A. I cannot say.

Q. 1136. Were you there three days?

A. I cannot say as to how many days.

Q. 1137. Would you swear that you were there a week?

A. I would not take an oath on any particular time. I have forgotten.

Q. 1138. You would not testify that you were there after the year 1898, would you.

A. I would not.

Q. 1139. Were you at that plant at any time that any breakage of the pipe-line or disturbance of the operation of the by-pass took place?

A. I saw no breakage in the pipe-line.

Q. 1140. How about the by-pass part of the question?

A. I saw no disturbance in the by-pass operation.

Q. 1141. Was there any such disturbance or trouble in either particular while you were there to your knowledge?

A. There was not.

Q. 1142. Do you know anything about the occurrence which Mr. Van Emon testified about the other day when the by-pass got jammed up at that plant and the pipe-line was consequently burst?

A. I know nothing about this. I may have known it at that time, but I do not now know it.

Q. 1143. Do you know of your own knowledge what

conditions are at present involving that plant, or what there may be left of that plant, if anything?

A. I know nothing whatever about this plant at present.

Q. 1144. Did the dynamometer or speed-load-sensitive device at the Power Development Company plant operate quickly?

A. It operated very quickly.

Q. 1145. How would you compare its speed of operation with that of the Lyndon patent governing mechanism?

A. There can be no comparison made as the mechanism is entirely different. The quickness on the part of the governor at Bakersfield rested especially in the load-sensitive feature. A change in this governor took place immediately following the change of load, and did not wait for change in speed.

Q. 1146. Then in so far as it operated responsive to changes of load without waiting for changes of speed, it was essentially a load-sensitive governor, was it not?

A. It was a compound governor dependent upon both speed and load changes. The load change was the feature which made it quick in starting operation. The speed-sensitive element was that which kept it balanced at all times.

Q. 1147. At what part of its operation did the load-sensitive terminate and the speed-sensitive commence?

A. The features were present at all times and in all movements, and to separate them would be impossible.

Q. 1148. Then this dynamometer was not a purely speed-sensitive device, such as the dynamo 8 of the Lyn-

don patent or the fly-balls of the Complainant's Exhibits E to L, and the analogous exhibits? Is that correct?

A. It would be a speed-sensitive device purely and simply when no load change occurred.

Q. 1149. If no load-change occurred, could any speed-change occur?

A. In a plant of this type it is necessary at all times that a very fine balance be maintained as between the load taken away and the load put into the mechanism, and it requires very little disturbance to disturb speed conditions; so that it is necessary at all times to have a speed-sensitive element to take care that there be no departure from the fixed speed.

Mr. Blakeslee: I will ask that the question be re-read and that an answer be given it.

Mr. Westall: The objection is made that the answer is complete and is as full and specific as the question demands, and constant repetition of this line of question leads to no other effect than to fill up the record and consume time.

(The question is read by the Examiner.)

Q. 1150. By Mr. Blakeslee: Please give a yes or no answer, coupled with any explanation you may want to make.

A. Such change may occur without a load-change in any particular unit of the plant, due to the influence of other parts affecting the head or pressure in the pipeline.

Q. 1151. Does not that change the load that the wheel is carrying?

A. It does not change the load that the generator is

carrying generally. We are governing the generator in these cases rather than the wheel.

Q. 1152. Irrespective of speed or load in this form of governor element or dynamometer, under the conditions you have mentioned, must there not be a change in relative speed between that of the rotation of the generator shaft and that of the rotation of the wheel shaft, which I understand are connected with opposite sides of this dynamometer respectively?

A. There must be that relative movement in order to operate the governor.

Q. 1153. Then is it not a question in this form of dynamometer of a ratio between the load which the wheel is carrying and the load which the generator is asking the wheel to carry, and does not that ratio determine the positions of the parts of the dynamometer?

A. It does not. Such a governor would not work.

Q. 1154. Well, if the speed of the wheel changes independently of the load imposed upon it by the generator, is not a variation of load demand made upon the wheel?

A. This reference to speed changes is indefinite and is not the one which is considered in designing these governors. It is not the way it is referred to when we speak of the speed-sensitive element of the governor. That resides in the weight and disposition of the heavy parts on the levers.

Q. 1155. Isn't it, as a matter of fact, in the use of this dynamometer, all a question of the load on the generator and the compliance of the wheel with this load?

A. It is all a question of actual load on the generator.

The dynamometer simply measures the amount of work going through it.

Q. 1156. And work is an exponent of load, is it not?

A. Work is load.

Q. 1157. A dynamometer means a measurer of work energy?

A. Dynamometer means a measure of energy.

Q. 1158. For measuring what?

A. Energy.

Q. 1159. Now, as a matter of fact, was not this dynamometer device primarily to shift the brushes on the commutator of an electric motor?

A. I am not acquainted with the original of this governor, it having been developed in its main features before my connection with the company.

Q. 1160. The Electrical Engineering Company owned the patent on this dynamometer?

A. I cannot say who owned it.

Q. 1161. Was there a patent on it, do you know?

A. There was a patent.

Q. 1162. Do you remember the name of the patentee and the date of the patent?

A. It was known as the Sessions-Van Emon governor. As to the other details, I am not informed—as to the patent itself, etc.

Q. 1163. The “Sessions” referred to was an officer of the Electrical Engineering Company, wasn’t he?

A. He was.

Q. 1164. In whose employ you were for a time prior to 1900?

A. I was employed by that company.

Q. 1165. When did that employment terminate?

A. It terminated in 1897.

Q. 1166. What month in 1897?

A. I can't say as to the month. I think it was during the summer.

Q. 1167. Did the episode of the installation of the Power Development Company's plant have anything to do with the termination of your connection with this company?

A. I think not.

Q. 1168. Unless it bears on matters which you would prefer not to discuss, will you please tell us why you left that company?

A. I left that company because the company went out of business.

Q. 1169. And as far as you know that was the last that was ever done with this dynamometer device? Is that not correct?

A. As far as my knowledge goes that was the last work that was done with it.

Q. 170. There is, nevertheless, is there not, a clear distinction between this dynamometer which had two inter-operating sides or members, respectively connected with the water-wheel shaft and the generator shaft, and which was responsive in its action to changes of relative speed of rotation as between these shafts and the speed-sensitive device also actuated in step with a water-wheel shaft such as that of the Lyndon patent in suit and the apparatus of Complainant's E to L?

A. There is no distinction except that the governor

at Bakersfield had the additional element of being set by load changes.

Q. 1171. And the other speed-sensitive devices referred to are purely speed-sensitive devices?

A. What devices do you refer to?

Q. 1172. Those of the Lyndon patent in suit and those of Complainant's Exhibits E to L.

A. Those devices are sufficiently speed-sensitive themselves.

Q. 1173. And purely such, are they not, as distinguished from the dynamometer?

A. Purely such.

Q. 1174. The Lombard governor device which you have referred to, namely, that of 1909 and say 1907, was not organized like that of Complainant's Exhibit W, was it?

A. I will ask you to make that reference more definite.

Q. 1175. Well, it did not contain all of the features or have all the operative possibilities or operative effects like Complainant's Exhibit W, did it?

A. I have not testified concerning such a governor. I think you have got your questions mixed.

Q. 1176. That looks like one on me. But let it stand for the time. Some reference was made to the Lombard, and it may be that I considered that it implied such use. However, the answer is sufficient. In Defendant's Exhibit Wetmore patent there is no returning device operating upon an electrical circuit-controller and actuating a solenoid core, is there?

A. In the Wetmore patent the returning device op-

erates an electric control. But that does not move to any extent the core of the solenoid.

Q. 1177. In the Wetmore patent there is no returning device put into operation through an electrical circuit-closer, is there?

A. The returning device in the Wetmore patent is mechanical in its nature, connected directly to the water-gate-operating shaft.

Q. 1178. In the Swiss patent the by-pass operating means is not connected with means which actually operates the water-gate in either direction, is it?

A. There is an actual connection between the main water-wheel gate and the relief valve in the Swiss patent.

Q. 1179. But the by-pass operating means are not connected with means which in themselves, independently of water in the penstock, operate the water-gate in either direction. Is that not correct?

A. The question is a little indefinite and I ask to have it made a little more clear.

Q. 1180. Is not the water in the penstock relied upon in this operation of the water-gate and of the by-pass, whereby, through the agency of the water from the penstock, or water in the penstock, operation of the by-pass and of the water-gate in part takes place?

A. All the movements of the water-wheel gate and by-pass are made by means of energy obtained from the water in the penstock.

Q. 1181. And some of that energy is directly applied by direct application of the water, is it not?

A. All of that energy is applied by direct application of the water.

Q. 1182. You have never seen a device constructed like that of the Swiss patent, or like that of the French patent, or like that of the Wetmore patent, or like that of the English patent, or like that of the Lamb patent, in use for governing a water-wheel, have you?

A. I have not personally seen these devices, but I know that the devices shown in the French patent are in use.

Q. 1183. What is the source of your knowledge?

A. The source is general and not particular.

Mr. Blakeslee: In that case we ask that that portion of the next preceding answer be stricken out as being merely a matter of hearsay.

Q. 1184. Now, if the word "either" as used in the Lyndon patent in suit and particularly in Claims 6 and 7 thereof means in effect "both", the French and Swiss patents are not pertinent to the Lyndon invention, are they, if it be assumed that positive connections are required in accordance with the Lyndon invention to cause the operation of the by-pass inversely to that of the water-gate in both directions, and by "positive connections" I mean such connections as are compelling and not connections which would be merely permissive.

A. The application of the word "either" in Claims 6 and 7 is to the water-wheel gates, and being such, the French patent and Swiss patent must agree as far as the main water-wheel gates are concerned.

Q. 1185. In the Swiss patent there are no means

compelling the movement of the water-wheel gate in both directions responsive to governor action, is there?

A. The means adopted in the Swiss patent to move the main water-gate is compelling in both directions, the application of this power in one direction or the other being determined by the governor.

Q. 1186. Yes. But the compelling action is simply permitted to be compelling, is it not? In other words, the action of the water in the penstock upon the gate is compelling in its action upon the water-gate to move it in an opening direction?

A. The action of the water pressure in moving the gate in one direction or the other depends on which of two forces predominates.

Q. 1187. As a matter of fact, the Swiss patent or device operates something like some of those strange marine creatures which draw into their systems a quantity of water and expel it for means of propulsion. Don't you think that is analogous?

A. I can see no analogy.

Q. 1188. If there is no water in the penstock the apparatus of the Swiss patent, as a working apparatus, is incomplete, is it not?

A. The apparatus would certainly not operate.

Q. 1189. Nor would it operate if power were applied to the shaft of the wheel from independent means, would it?

A. Under this totally abnormal and not-to-be-expected condition, there would be no operation of the water-wheel gates, nor any required.

Q. 1190. But there would nevertheless be a formal

operation of the water-gates and by-pass of the Lyndon construction, would there not?

A. I imagine that the Lyndon device would operate no better under those conditions than under the normal ones, nor any worse.

Q. 1191. But the Lyndon apparatus would go through its evolution just the same, would it not?

A. I see no difference as to whether there is water in the penstock or not, in the Lyndon patent.

Q. 1192. A like comparison may be made, may there not, between the device of the French patent and the Lyndon device, at least with respect to the by-pass or relief valve features therein?

A. In the French patent the by-pass features as shown in the drawings would not operate without water in the penstock, nor would it be required to.

Q. 1193. If you were preparing a patent application on the devices of the French patent and Swiss patent, would not you be tempted to include in the combinations water, as an element?

A. The drawings of the French patent would involve the use of water as an element.

Q. 1194. And how about the Swiss patent?

A. As shown, the drawings would require water.

Q. 1195. Do you think the correlations in the Swiss and French patents are definite?

A. I do.

Q. 1196. Water leakages or water-flow obstructions in those governors would interfere with these correlations, would they not?

A. To what obstructions are you referring?

Q. 1197. Obstructions of the ducts and passages through which the water is conveyed in the governing operations and against by-pass control.

A. Obstructions in these parts if permitted to take place would disturb governing conditions as is any other device intended for that purpose.

Q. 1198. As far as you know the Mammoth Bar Gold Mining Company plant and the Power Development Company plant as testified to by you were the only plants ever constructed in substantial accordance with the Berry Blueprint No. 1 and Cobb Blueprint No. 1. Is that correct?

A. They were the only plants constructed in accordance with these blueprints.

Q. 1199. Do you remember the number of relief devices in the penstock of the Power Development Company plant?

A. I do not.

Q. 1200. Do you remember any sticks or floating objects clogging the water-gate nozzles of the Power Development plant?

A. I do not.

Q. 1201. Referring to the Berry Blueprint No. 1, to figure 1 thereof, are the positions of parts therein indicated the positions thereof at full load on the wheel?

A. That is the position at full load.

Q. 1202. What would be the position of those parts with the load decreased?

A. Levers 2 2 would move outward a certain amount.

Q. 1203. Now, supposing you were operating at full

load and the speed decreases. What will be the position of the parts?

A. It would indicate a condition beyond the capacity of the unit. There would be no movement.

Q. 1204. What will be the positions of the parts with no load upon the wheel?

A. The levers 2 2 will be in their outer position.

Q. 1205. In outermost position?

A. Be in their outermost position provided there are stops at that point. Otherwise not.

Q. 1206. Well, there would be a limit to such movement, would there not?

A. There would be a limit in the drawings shown.

Q. 1207. And they would be at that limit with no load?

A. That is a question of design.

Q. 1208. Well, following the design which you have provided for in this blueprint, would they not?

A. As I remember it, it is approximately the condition. I cannot say that it is exactly so.

Q. 1209. Now, supposing the speed of the wheel increased. What would occur as to the position of these parts?

A. That is a condition very unlikely to happen, inasmuch as the water-gate nozzles would be closed.

Q. 1210. Could not the main gate be opened under these circumstances?

A. The main gates would not be opened under these circumstances.

Q. 1211. Supposing they were opened; what would happen?

A. They could not be opened by an increase of speed under these conditions.

Q. 1212. When the main water-gate was closed, were those levers, namely, the levers 2 2 and the weights 3 3 in their outermost positions?

A. I presume they were so. I do not remember exactly.

Q. 1213. Well, you have testified readily as to other features of operation of this mechanism. Can you not equally accurately testify as to this feature?

A. I would expect to find a stop about that point or at that point.

Q. 1214. If the mainwater-gate was closed, did these levers occupy these outermost stop positions?

A. It is not necessarily so, as a stop could have been placed in some other portion of the mechanism. It might not have been so, however.

Q. 1215. Were not those levers stopped in their outward movement by the inner periphery of the wheel eye or annulus eye?

A. They were so stopped when they reached that point.

Q. 1216. And that is the condition which corresponds with complete closure of the main gate?

A. That is approximately the position.

Q. 1217. Now, supposing the main gate was opened and no load was imposed on the wheel. What would be the strained positions of the levers?

A. The question is entirely indefinite, inasmuch as those two conditions do not normally obtain.

Q. 1218. Well, let us suppose that some fool opened

the water-gate when there was no load on the wheels, and the levers were in this position. I do not think this is a facetious custom, as I take it that a governor should be fool-proof as far as possible.

A. As I remember the device, there is no means provided by which a man could open the gate under these conditions.

Q. 1219. I am talking about the main gate supplying water from the penstock to the wheel. I have used the term "main gate" all the way through.

A. I have been answering these questions with the understanding that you referred to the water-wheel gates which were the only ones affected by this governor.

Q. 1220. There was a main gate in that Power Development Company plant, marked, as I remember it, F.

A. There was a main gate in the pipe-line.

Q. 1221. Photograph, being Defendant's Exhibit Interior of Power Development Company Power House, does that have anything to do with that installation?

A. I have already answered that question. It is shown at F.

Q. 1222. Now, supposing this main gate were closed, as I understand it, there being no load upon the wheel, under the same supposition, and the levers 2 2 of Berry Blueprint No. 1, would be in their outermost stopped positions, would they not?

A. Not at all. They would be in their inner position, the water-wheel necessarily not having any motion under these conditions.

Q. 1223. Now, suppose the main gate is opened suf-

ficiently to cause the wheel to speed up, there being no load upon the wheel, so that the levers 2 2 are brought to their outermost stopped positions and the wheel is running at normal speed. What will be the condition of the water-wheel gates, there being no load, as I say, upon the wheel?

A. The water-wheel gates would be nearly closed. Whether the wheel would reach normal speed or not would depend on how much water was passing through the main pipe gate, and what the pressure was.

Q. 1224. Now, supposing you further and widely opened the main gate and no load is imposed upon the wheel, what, if any, movements would the lever 2 2 execute?

A. Under the former abnormal condition of nearly closed main pipe gate, the wheel would not reach normal speed. It would do so only on application of the full pressure to the water-wheel gates. Therefore, as it had not reached its outermost position, there would be a movement in that direction.

Q. 1225. Then there are two different positions for these levers 2 2 to correspond with a no-load condition upon the wheel? Is that not correct?

A. It is not correct, inasmuch as the governor was designed to take definite positions under certain head or pressure in the pipe-line. An abnormal condition would very likely vary these conditions, but those conditions are not the operating conditions of this wheel.

Q. 1226. In other words, this dynamometer would not take care of conditions of abnormal or abnormal con-

ditions of pressure of water in the penstock in the speed of the wheel or abnormal variations therein?

A. It was this very feature which led to the introduction of the by-pass valves.

Q. 1227. And that characterizes the dynamometer, including the levers and weights, as most essential to load government?

A. It does not necessarily do so. All conditions which have been recently discussed appear to the abnormal positions or conditions of the main pipe-line gate, under which no sane man would attempt to run the plant. And if any man should do so he would have to expect the results of such deviation from common sense.

Q. 1228. Could you have any more than one normal position for the levers 2 2 for any given load on the wheel?

A. Such normal position is the result both of load and speed, the governor being dual in its nature.

Q. 1229. Then if this governor were acting as a speed governor and it commenced to operate as a load governor, how would these rigid levers respond to the conditions of both kinds of action?

A. The question is absolutely indefinite and it does not cover the operating conditions, inasmuch as the governor is at all times a speed and load governor, and I know of no time in normal operations when these elements are separated, there being always a greater or less load when the wheel is running.

Q. 1230. Then it would be impossible to have the same speed of wheel at two different wheel-loads, would it not?

A. The speed returns to its normal after any deviation therefrom.

Q. 1231. Supposing speed and load both varied at the same instant. To which variation will this dynamometer first respond?

A. Assuming both speed and load variation in the dynamometer, it responds to both influences.

Q. 1232. Supposing the speed increases and the load ^{and} increases at the same moment, what will be the operation of this ^{and} dynamometer?

A. That is an abnormal condition which we do not usually expect in a power plant.

Q. 1233. That condition would happen if you opened your main gate more as your load increased?

A. I have already characterized the attempts to run the plant with a partly-open main gate, as an abnormal condition.

Q. 1234. That does not make any difference. Assuming abnormal condition, because I shall show shortly why I am assuming that abnormal condition.

A. I am not prepared to accurately predict what would happen to the governor parts under such abnormal conditions.

Q. 1235. Then this governor was likely to buck or fall down or fail, was it not, if there were any changes in load and speed at the same time, or if changes in the flow of water in the penstock took place, particularly, synchronously with such changes in speed and load?

A. As this governor was put in operation and operated successfully, and as I did not see any such changes, I cannot predict that that would obtain.

Q. 1236. Now, as to the governor of Complainant's Exhibits E to L, in the analogous exhibits, do you not believe that governor can be relied upon to take care of all conditions resultant upon change of speed, change of load, or change of load upon the penstock, to keep the wheel speed rate constant and within the limits of its construction? That is, practically within the limits set by the play permitted to the fly-balls?

A. The device shown in the exhibits noted being a speed-sensitive device, acts on speed changes, and is responsive to speed changes, regardless of the source of such changes.

Q. 1237. And the same is true or intended to be true of the governor of Complainant's Exhibit Lyndon patent? That is to say, what is aimed at in that disclosure, is it not?

A. This is the general intent of all water-wheel governors, to control the speed of the water-wheel.

Q. 1238. You do not consider the apparatus of Complainant's Exhibits E to L, and the auxiliary complainant's exhibits, inoperative because the relief valve is only utilized during a general closing movement of the water-wheel gates, irrespective of any possible back-and-forth inverse movement of both during governor action, do you, and, of course, excluding the return movement of the by-pass or relief valve?

A. The question is very indefinite and does not apply to the operation of this device, and I can answer it only by saying that it is an operative device and it operates as intended.

Q. 1239. Do you take it that the relief valve or by-

pass valve of those complainant's exhibits operate inversely to the water-wheel gate during governing action, and during both closing and opening movements of the water-wheel gates?

A. It operates inversely only at times on the closing movement of the main needle nozzle valve, and not at all times during this closing movement.

Q. 1240 Do you consider that that renders those installations inoperative?

A. That being the specific object of this design, I should not consider it as inoperative when it performs the functions for which it was designed.

Q. 1241. Then the governor mechanism of these installations under discussion is not rendered inoperative merely because the inverse operation of the water-wheel gates and the by-pass valve does not occur during both general opening and general closing movements of the water-wheel gates?

Mr. Westall: We are willing to admit on the record that it is not rendered inoperative by either the matters pointed out, or anything else. That is to say, there is no possible question, so far as the defense is concerned, as to the inoperativeness of defendant's devices.

Q. 1242. By Mr. Blakeslee: Then, I take it, in considering the subject of Claims 6 and 7 of the Lyndon patent in suit, you have meant to imply in your direct examination that for ordinary water-wheel governing the water-wheel gates must be capable of operation in both opening and closing directions. Is that correct?

A. I cannot imagine a water-wheel being operated

under any other condition except that the water-wheel gate shall open and close when so required.

Q. 1243. And you do not find in Claims 6 and 7 of the Lyndon patent in suit, do you, any statement that the by-pass valve must operate inversely to the water-gate in both directions of water-gate movement? That is, both closing and opening directions?

A. That is the plain intent of Claims 6 and 7, as I understand it.

Q. 1244. Do you say that is the plain intent because you find that occurring in the operation of the apparatus pictured and described in the Lyndon patent in suit?

Mr. Westall: Objected to as having been already fully covered in the previous cross-examination of the witness. We have no objection, and, in fact, we would prefer to have this matter emphasized, but we believe it is entirely unnecessary to have it repeated so many times.

A. Such conclusion would be reached by reading Claims 6 and 7, without reference to anything else.

Q. 1245. By Mr. Blakeslee: Now, supposing we have a construction or an installation comprising a tram car or passenger-carrying car or railway car, operating upon an incline, and we have means provided for operating that car in either direction—yes, and I will say both directions—up and down the hill, such as a switchback, and we have brakes for the car operating inversely to the operation of the car or operating inversely to the direction of rotation of the wheels of the car. Would you understand such statement to require the application of the brakes when the car was going up the incline?

A. The situation as stated is exceedingly indefinite. I have never been aware that a brake operates inversely to the car in any sense. The function of a brake is to check the speed when called on to do so, and would not normally be used under any other conditions.

Q. 1246. It would only be used under conditions obtaining making its use necessary to check the motion of the car?

A. It is installed for that purpose.

Q. 1247. Now, you have admitted that varying conditions exist in pipe-lines conveying water to hydro-electric plants. Understanding these conditions, being posted as to the use of the by-pass to correct either or both of these conditions, would you not understand anyone using such by-pass for one purpose or the other to be utilizing the general knowledge taught as to the advantage of such by-pass in all its possibilities or applications?

A. I have not testified as to varying condition in pipe-lines as being any different on closing movement of the gate than on an opening movement, except in so far as such effects would increase the strain on the pipe, and if excessive might rupture the same. I have carefully stated the fact that inertia effects obtain both on a closing movement of the main water-wheel gates and on an opening movement; that these effects are the same in extent with equal velocity changes. As far as affecting the governing of the wheel is concerned, these effects are equally injurious in one direction as in the other, and when the desire is to preserve constant velocity and constant pressure in the pipe-line, these conditions must be

taken care of both on opening and closing movement of the main water-wheel gates. In view of these conditions, the means which any particular designer would apply to the problem in hand, would depend altogether on his idea as to the result he desired to accomplish. Should he desire to maintain constant velocity and constant pressure in the line, he would necessarily have to take care of these inertia effects both on an opening and closing movement of the main water-wheel gates. While, should he consider that danger to the pipe-line as a vital element, he would adopt such means as would prevent such excessive pressure and disregard the other view of the case. His selection would depend to a very great extent upon the desirability and necessity of water economy.

Q. 1248. Aside from water economy, do you not think there was a reason why the by-pass valve, or relief valve or valves of Complainant's Exhibits E to L were disposed so as to open on a closing movement of the water-gates in contradistinction to closing or an opening movement of the water-gates, not now considering the inverse closing and opening movements of both, which might take place during governor action.

A. This question is somewhat vague and indefinite, and the idea I gain from it is that a relief valve was made to open to save water, whereas such is not the case, it opening when necessary to prevent excessive pressure in the pipe-line.

Q. 1249. And those valves take care particularly of the pressures in the pipe-line incident to water-gate closing, do they not?

A. The automatic relief valve in the defendant's device prevents excessive pressure in the pipe-line when such would be produced by the closing movement of the valve of the main needle nozzle, did not this relief valve operate.

Q. 1250. Why do you suppose these plants were not particularly devised to also take care of the opposite inertia effects in the pipe-lines, namely, those incident to water-gate opening, leaving out of the question the actions of the water-gate valves and the relief valves during the period of governing action?

A. The last clause in this question renders it vague and indefinite. Answering that part which contains a query, I should say that defendant's device was not designed to take care of inertia effects which followed an opening movement of the valve of the main needle nozzle, for the reason that such provision involves a waste of water which in most plants of today cannot be permitted.

Q. 1251½. How about the waste of water with respect to the Power Development Company installation, or in connection with the attempted use of the by-pass?

A. There was no waste of water in the Power Development Company's plant at Bakersfield, for the simple reason that all the water had to flow, whether used on the wheel or not, prior rights to the flow of the stream making it necessary that there be no interruption of such flow.

Q. 1252. But was there or was there not between periods of governing action in the attempt to use this by-pass a passage of water through the by-pass?

A. There was a flow of water through the by-pass as installed at Bakersfield at all times except when the water-wheel gates were wide open, this being necessary to fulfill the conditions of that type. This was a permissive condition which was taken advantage of to apply the methods there used, and was not a forced condition, inasmuch as this water could have been discharged, when not required, from the flume.

Q. 1253. You say that condition was provided there to take care of conditions in the pipe. In what respect?

A. As I understand the question, the combination of main waterwheel gates and by-pass valves operating inversely, was installed for the purpose of preserving a constant flow and constant pressure in the pipe-line to facilitate governing. There was no question as to how much water was used in the water-wheel gate and by-pass, provided it did not exceed the maximum demanded by the wheels at full load.

Q. 1254. Now, please assume a pipe to a water-wheel plant 2500 feet long and having a diameter of 20 inches, and extending on a straight slope or incline of 45 degrees. Suppose the gate at the lower end is instantaneously opened, or rapidly opened, from full closed to full opened position. Will there be under those conditions an inertia effect in the pipe-line?

A. There will be a very decided inertia effect in the pipe-line.

Q. 1255. Will the pressure be a collapsing pressure or bursting pressure in the pipe-line?

A. It will be neither, unless the pipe-line is improv-

erly designed and the pressure drops below atmospheric pressure.

Q. 1256. Now, assuming that at the upper end of this pipe-line there is a connected pipe-line of a thousand feet lying horizontally and tightly jointed to it. What will be the nature of the pressure in the inclined pipe-line?

A. That will depend on how much head there is on the horizontal pipe-line.

Q. 1257. Well, assume a 50-foot head.

A. There would be a fall in pressure in the low portions of the pipe-line. To what extent, would depend on the size of the pipe in relation to the gate opening.

Q. 1258. Would there not be a collapsing pressure set up in the pipe-line, less than that of atmospheric pressure?

A. That is altogether a question of relationship between the size of the pipe and the size of the opening of the gate.

Q. 1259. Would it ever exceed 14.7 pounds per square inch of collapsing pressure?

A. That being the limit of what is known as suction head, pressure cannot go below it.

Q. 1260. You mean the collapsing pressure could not be less than 14.7 pounds per square inch or more than that?

A. I mean that the pressure below atmospheric cannot exceed 14.7 pounds per square inch.

Q. 1261. Therefore the collapsing pressure could not be greater than 14.7 pounds in the pipe-line?

A. It may be so worded. Yes.

Q. 1262. Now, with the same pipe-line and the gate at the lower end of the inclined portion thereof in widely open position, and a constant velocity of the water in the pipe-line taking place, would there be collapsing or bursting pressure created in the pipe-line by instantly or suddenly closing the gate?

A. There would be an increase in pressure.

Q. 1263. Would it be a collapsing pressure or a bursting pressure?

A. A bursting pressure.

Q. 1264. What would be the maximum bursting pressure per square inch on the pipe-line?

A. That is depending upon the extinguished velocity of water in the pipe.

Q. 1265. Assume a velocity of 10 feet a second before you close the gate, and I think you have all the other factors necessary, namely, pipe lengths, diameter, inclination and length of horizontal portion and head.

A. None of these conditions apply necessarily. That one which does apply is not given, namely, the thickness of the pipe.

Q. 1266. What has the thickness of the pipe got to do with the pressure on the pipe?

A. It is the thing which controls the maximum pressure reached under these conditions.

A. 1267. It does not establish the pressure, does it?

A. It does. It is the vital element in establishing the pressure.

Q. 1268. Well, supposing it is so thick that no such pressure at any point could burst it. What would

be the maximum pressure which would show on the pressure gauge near the gate in the pipe-line?

A. As I have stated, the maximum pressure would depend on the thickness of the pipe, and I am not now referring to the bursting questions. Under ordinary conditions, the pressure resulting from the extinguishment of a velocity of 10 feet per second would range from 300 to 500 pounds to the square inch.

Q. 1269. So you have two very different inertia effects produced, have you not, in the two cases assumed?

A. The cases are not comparable, inasmuch as the assumptions in the latter case could not be made to apply to the assumptions in the former case.

Q. 1270. What is the difference in the assumption?

A. The difference is vital, inasmuch as in the former case the acceleration of a column of water would not be as rapid as the retardation in the second case.

Q. 1271. Let us assume the same rate of gate movement in each case.

A. I have not included that item in discussing the question at all.

Q. 1272. But, nevertheless, you would have a greater pipe pressure in one case than in the other, everything being assumed as we have assumed it, would you not, and due to the inertia effects in the pipe-line?

A. The inertia effects in the pipe-line are directly dependent upon the change in velocity and the consequent pressure which would depend upon that same thing.

Q. 1273. In order to make a proper comparison,

would you wish to assume any other factors entering into this problem?

A. I would desire especially to assume conditions which could be established at all in governing water-wheels, namely, that these pressure variations should be kept within reasonable limits.

Q. 1274. In other words, you would desire to have put on that pipe-line some safety means which would take care of both these inertia effects, wouldn't you?

A. Not necessarily.

Q. 1275. Wouldn't you think such a safety means desirable?

A. I would consider auxiliary safety devices to take care of excessive pressure as desirable.

Q. 1276. Would not the apparatus of the Lyndon patent in suit in conformity with the object stated in the Lyndon disclosure, attaching to the use of such apparatus, be advantageously applied to compensate for or provide against evil effects of both these inertia conditions?

A. It would provide against any inertia effects provided it was so designed as to realize the aims of the inventor to the fullest extent.

Q. 1277. Now, without the horizontal section or portion of the pipe, I believe you found that you would not get the collapsing inertia effects in the pipe-line. Is that correct—due to inertia under the conditions assumed?

A. As I have stated, such a result would depend on the ratio of the area of the pipe to the gate opening.

Q. 1278. Well, assume conditions of flow or velocity

the same in each case, and my proposition is correct, is it not?

A. I do not understand the assumption as to the equal flow in each case, unless it is further cleared up.

Q. 1279. Well, assume a normal velocity in each case of uninterrupted water about 10 feet per second, so that the velocities would be varied from zero to ten feet in the first case when the gate was opened, and the velocity would be varied from the maximum or ten feet to zero in the second case when the gate was closed. Now, in the first case, without the horizontal length of pipe, you would not have a collapsing effect due to inertia effect of the pipe-line, would you?

A. The pressure change would be the same in both cases provided conditions in the first case were such as to permit such a speed change. In other words, pressure change either up or down is dependent upon velocity of change and if the velocity of change is the same in both cases the pressure change must be the same.

Q. 1280. Would there be a collapsing pressure in the case of the omission of the horizontal length of pipe and gate opening?

A. There would be a collapsing pressure at the upper end of the pipe, provided at that point there was not sufficient pressure origin to permit this acceleration.

Q. 1281. And that collapse effect would not equally take place with the horizontal length of pipe omitted?

A. I am now referring to the pipe-line without the horizontal portion.

Q. 1282. Well, at any rate, these pressures which you have differentiated, would require different means

for their correction, would they not, namely, the collapsing pressure and the bursting pressure?

A. As far as the effect on governing is concerned, they being equal in extent, they would have equal effect. So far as danger to the pipe-line is concerned, it is the bursting pressure which must be taken care of.

Q. 1283. And the collapsing pressure is also to be taken care of, is it not, for the maximum collapsing effect which you have admitted occurs in excess of the strength of the pipe to resist it?

A. Such collapsing pressure would have to be taken care of. In a properly designed pipe-line the conditions are so arranged that this collapsing pressure cannot take place.

Mr. Blakeslee: I ask that the last sentence be cut out as not responsive.

Q. 1284. Mr. Blakeslee: This collapsing pressure would take place under the conditions assumed with the horizontal section of pipe included when it would not take place if the horizontal section of pipe should not be present, and there were not other means for immediately supplying water to the inclined section of pipe? Is that not correct?

A. There is no difference between horizontal pipe and an inclined pipe in this case. The question whether there is a collapsing pressure would depend altogether on the relation of the fall in pressure to the head which was present on the pipe-line at any portion.

Q. 1285. Supposing the water were supplied in a collapsing action to the inclined pipe section of 2500 feet mentioned, through a pipe having an opposite slope in-

clination; that is, uphill to the entrance of the 2500 foot section mentioned. Would not the collapsing effect in the latter case be more pronounced?

A. Placing this previously horizontal pipe to run uphill to it juncture with the inclined pipe, does not alter the general condition stated previously. The collapsing pressure at the junction of these two portions being dependent altogether upon the relation of the pressure drop to the head which existed at that point before the velocity change.

Q. 1286. Then, I take it, you do not sense the difference which exists between collapsing effects in pipe-lines of the same inclination, with different inclinations of pipe-lines leading into such inclined pipe-lines and jointed tightly thereto without any openings to the atmosphere, the sizes of the pipe being the same in both cases, do you?

A. As I have before repeatedly stated, the inclination of these pipes as to collapsing pressure has nothing to do with the question, it depending solely and absolutely on the relation of the fall in pressure to the previously existing pressure at any portion of the pipe or in any pipe arranged in any manner desired.

Q. 1287. These falling pressures may differ under different conditions of water supply at the upper end of the inclined pipe, may they not?

A. I do not understand that condition. Does it refer to the supply of water to the initial portion of the pipe, or to the initial portion of a certain section of the pipe?

Q. 1288. It applies to the supply of water at the initial portion or upper end of the main inclined pipe.

A. This question is involved and completely taken care of by the previously specified conditions as to the pressure existing at any portion of the line which may be considered.

Q. 1289. Then, Mr. Berry, I ask you, as a hydraulic engineer, as I understand you to be, of some twenty years or so experience, if this is the best answer you have to give to this question or the only answer, or whether you wish to give any other answer, or any other answer to any part of this general discussion of inclined pipe-lines and pressure falling, due to inertia?

Mr. Westall: Counsel for the defendant objects to the needless repetition of questions along this line. The Court will very readily see that they have nothing to do with the vital issues in this case. They go into matters of theory which can have no possible bearing upon the ultimate decision of the case, and their only object seems to be, as I have previously stated, to consume time and amplify the record beyond all reasonable bounds.

Mr. Blakeslee: The present question is put in the endeavor to limit this inquiry, and I throw open now to the witness all the last twenty or thirty or forty questions concerning these inertia effects on the pipe-line. He can have any and all of them read, change his answers if he wishes, amplify his answers, and if he gives one final answer to any one or all of them, or several final answers, we will drop this discussion right here and proceed to the conclusions based upon his answer.

Mr. Westall: The witness is instructed that he need

not avail himself of the liberal offer to so open the whole record made this afternoon upon this question.

Mr. Blakeslee: It becomes painfully manifest that counsel for the defendant cannot grasp the manifest importance of these questions, or, at least, does not wish the witness to have a full chance to clear himself and elucidate the matter; and, furthermore, we must politely decline to accept the charge of liberality extended by the defendant, as we do not throw open the whole afternoon's record to revamping by the witness, but only that part which affects the pipe conditions and inertia effects connected therewith, which the Lyndon patent in suit most certainly makes of some vital value, as they relate to opening and closing movement of gates and correlated by-pass movement. If the witness wishes not to avail himself of the offer, we will have to decline, regretfully, to attempt to dig up from the witness further testimony in this matter and take, possibly, a great deal more time in our rebuttal procedure in the case. Now, the witness may choose.

A. My answers to this line of questions have been based carefully on fundamental laws of hydraulics, which should be fully known to anyone engaged in this line of work; and there is no question to which I desire to change my answer.

Q. 1290. Mr. Blakeslee: Were you a subscriber to the Journal of Electricity in the years 1896 and 1897?

A. I cannot say definitely whether I was or not.

Q. 1291. Do you know what governor is used now in the plant of the Power Development Company referred to, if that plant is still operating?

A. I have no knowledge on that subject.

Q. 1292. Now, as between a mechanical path consisting, we will say, of some half-dozen mechanical parts of levers and links transmitting motion, say a hundred feet, is there any more chance for lost motion than there is in an electrical transmission path through an unbroken circuit or an unbroken electrical path over the same distance?

A. There would be less lost motion provided the circuit is complete. There will, however, be more danger that there will be no motion at all.

Q. 1293. Referring to the Complainant's Exhibit Lyndon Patent, could the by-pass valve not be set in normally closed position so as to be only opened on closing movement of the water-gates, irrespective of the inverse operations of the water-gates and by-pass valve during governing movement, by substantially straightening out one-half of the slot 44 as shown in figure 6?

A. The by-pass valve as shown and described in the Lyndon patent could not be set in closed position as its normal position without totally disregarding the plain intent of the specification. Furthermore, this valve could not be so placed with the mechanism provided for controlling its movements as shown. Furthermore, straightening out one-half of the slot 44 would not affect this question in any manner whatsoever.

Q. 1294. You would have to adjust the ropes 51 and 52 by turnbuckles, as we have previously discussed, or adjust the ropes on the sheaves 54, or, perhaps, more than half straighten out the slot 44 by giving it a different

curvature than that shown. In that case, would not the conditions of the previous question be complied with?

A. They would not. There would still remain two obstacles. First, is the plain declaration and intent of the declaration, and, second. the mechanism provided for controlling the movement of this by-pass valve.

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Q. 1295. Referring to Defendant's Exhibit Lombard Patent No. 533656, and to Complainant's Exhibit W, please state whether or not such Lombard patent constructed is capable of performing as per this exhibit, the function of Complainant's Exhibit W.

A. The device as shown in Defendant's Exhibit Lombard Patent No. 533656 will perform all the functions shown in Exhibit W, with the exception that it does not contain the automatic adjustment for the opening of the valves which controls the oil from one side of the piston within the dashpot to the other.

Q. 1296. That omission of the feature pointed out results in the omission of certain functions also, does it not?

A. It results in the omission of an adjustment which may or may not be required, depending upon circumstances.

Q. 1297. What I am trying to determine is whether or not the omission of that feature which you have pointed out to be in Exhibit W but not to be in the Lombard patent, does not eliminate the possibility of a certain further function being performed by the Exhibit patent structure.

A. I fail to understand to what further functions you refer.

Q. 1298. Then I will ask again, if it is possible for the subject of the Lombard patent under discussion to perform all the functions which may be performed by Exhibit W?

A. The device shown in the Lombard patent mentioned is not so completely applicable to all conditions as the device shown in Complainant's Exhibit W. The addition in the device of the Exhibit W was evidently made to increase the flexibility of application of this device to varying conditions in power house installations.

Q. 1299. The features which are present in Exhibit W and missing in the Lombard patent disclosure, permit of a controlling valve or balanced valve which we have discussed as controlling the admission of power fluid to the cylinders to operate the water-gates to return to normal position in either direction at a variable rate. Is that not correct?

A. The rate is variable in different parts of the stroke. The sole effect of this addition to Exhibit W being to change the rate of slippage between the piston and casing of the dashpot during different parts of the stroke of the casing.

Q. 1300. Now, Mr. Berry, some of your testimony given in this case is at variance with certain testimony given by other witnesses. As to that, do you wish the court to understand that the testimony in which such variance occurs is either right or wrong, or both right and wrong?

Mr. Westall: Objected to. If counsel will point out

any specific place and state wherein he conceives that there is a conflict in testimony, the witness might be able to give an intelligent answer.

A. My testimony in regard to this point is based on my understanding of the mechanism and not on the testimony of any other witness.

Q. 1301. By Mr. Blakeslee: I am not inquiring about this particular matter, but I am making a statement as to certain portions of your entire deposition and comparing them with the testimony of other witnesses. I am not stating that your testimony is right or that your testimony is wrong. I am simply saying that as to such portions of your testimony in which such variance occurs, do you wish your testimony, if it be found wrong in those respects, to be considered either right or wrong, or both right and wrong?

Mr. Westall: Counsel demands that the parts of the testimony referred to be read to the witness in order that he may give an intelligent answer. It is impossible to know what counsel has in mind, and I instruct the witness that he need not answer the question.

Mr. Blakeslee: This deposition, the court will perceive, is becoming more and more unfit for consideration, because of the assumption of counsel for the defendant of judicial function, consisting in directing the witness, which he has done repeatedly, and which he has no right to do, there being no questions here of privileged communication, disclosure of confidential matter, tendency to incriminate the witness, or any such like. And this question is manifestly a fair and proper one.

Its import and purpose is clear, and we will again ask the witness to answer the question.

Mr. Westall: The witness is again instructed that he need not answer the question unless directed to do so by the court. The question is so absolutely nonsensical, that we object to the filling of the record with such matter. If counsel conceives that he has a right to have this question answered, let him apply to the court for a rule on the witness to answer. We again repeat our demand that the parts of the testimony referred to generally by counsel be pointed out to the witness, otherwise an answer could not be of any possible advantage, or could not possibly be intelligible in any way. It is to be presumed that every witness speaks the truth, and if his testimony is not the same as that of some other witness, that is a matter for counsel to bring out at the argument.

Mr. Blakeslee: Counsel for complainant refuses to accept the offer of counsel for defendant to participate in his action in the nature of coaching the witness, and the sense of the question is apparent, whether it be grasped by counsel or not. The witness will have another opportunity to answer the question.

Mr. Westall: And the witness will be again instructed that he need not answer. There is certainly a limit to the amplification of the record with matters which have as little sense as the question last put.

Mr. Blakeslee: The sense of a thing depends on the power of comprehension, of course, and we do not feel required to point out any further what the sense is.

Q. 1302. By Mr. Blakeslee: Do you wish to answer, Mr. Berry?

A. The question is of such a nature that it cannot be answered.

Q. 1303. But you are quite sure that you could distinguish between the motion of the water-gate in either one direction or the other, or a motion in both directions?

A. I fail to understand the meaning of this question.

Q. 1304. You seem, Mr. Berry, particular that the specification of the Lyndon patent be followed very closely, and narrowly in places, but have expressed your desire that the Claims 6 and 7 of the patent must be considered so that the word "either" appearing therein means "both", in spite of the fact that such substitution of terms would require pluralizing the word "direction", appearing in each instance after the word "either" in these claims. Now assuming for the time being that the rules of grammar may be shoved about as you wish or as I wish in this respect, and referring to Complainant's Exhibits E to L, and the allied exhibits such as KKK and ZZ, if in the operation disclosed in these exhibits the usual load and speed fluctuation takes place which are indicated, for instance, by the operations or oscillations of the volt-meter needle, must not the by-pass or relief valve operate inversely to the water-gate or water-gate valves, or needles, in both directions when governing action is taking place, assuming, ^{if} ~~that~~ ^{wish} you ~~show~~, that during such governing action changes of speed take place; and, if you wish, you may definitely assume that

during such governing action three increases of speed occur in alternation with three decreases of speed.

A. The connection of the various parts of this extremely indefinite question is not clear. Referring to the first part, I am not attempting to construe Claim 6 more than to read the plain statement therein contained. Concerning the reference to defendant's device as shown in the exhibits mentioned, the assumptions are such as to produce extremely complicated unpredictable results, these assumptions being so bound up in the various movements and responses to the various parts of the device that it is absolutely impossible to conceive of a clear answer to such a question.

Q. 1305. Is there anything about this question which you do not understand? That is, is there any assumption made or qualification injected which is not clear to you?

A. I had stated that the assumptions made lead to results which cannot be predicted. And if the case is assumed sufficiently simple in nature so that the results can be followed, I will be very glad to answer.

Q. 1306. You are not prepared to say, are you, that the supposed result stated in the question will not occur?

A. In answer to that I will state that the device is arranged, or that the movement of the valve of the automatic relief nozzle is inverse to that of the main needle nozzle during part of the closing movement of the said main valve and that it is further designed so that an opening movement of the valve of the main needle nozzle does not oppositely affect the valve of the ~~needle nozzle does not oppositely affect the valve of the~~

auxiliary relief nozzle except possibly under somewhat abnormal conditions when the coincidence of such movements may possibly take place.

Q. 1307. The governor is intended to take care of and provide for and operate responsive to such abnormal conditions, is it not?

A. To the extent to which it is capable of doing so.

Q. 1308. And such inverse operation of the two valves, namely, the water-gate valve and the relief valve or by-pass valve, alternately inversely, upon the existence of alternately opposite speeds, would take place during governor action, would they not?

A. The wording of this question leaves it somewhat vague.

Q. 1309. Well, to simplify it, if there should be a movement of the needle of the water-wheel nozzle first in one direction and then in another, accompanied by an inverse movement of the needle of the by-pass valve or relief valve, in each direction of movement of the water-gate valve needle, such action would occur during governing operation, would it not?

A. The design of this device is such that the inverse action on the part of the valve of the auxiliary relief nozzle does not take place on an opening movement of the main needle nozzle.

Q. 1310. And are you prepared to say that it does not take place when both needles are off their seats during governor action?

A. As I stated previously, there may be coincidentally such movement, but if it occurs it is in response to the valve of the main needle, but it is simply the result

of coincidence on the part of the valve of the main needle as to its movement relative to that of the valve of the auxiliary relief nozzle.

Q. 1311. And this coincident action of the gate-nozzle needle and the relief or by-pass nozzle needle is responsive to governor action, is it not?

A. These two movements would be responsive to different governing actions, and not to the same.

Q. 1312. What I mean more particularly is, that this coincident action is responsive to governor control or control by the governor or features. Is that not correct?

A. This coincidence is the result of an overlapping of governor action, the tail end of one over the beginning of the next.

Q. 1313. But the coincidence is maintained by action of the parts of the governor construction or organization, is it not?

A. All movements of these valves result in governor action at one time or another.

Q. 1314. Referring to the installation which you have testified about, the Mammoth Bar Gold Mining Company and the Power Development Company, is it not a fact that the most particular service and functions of the so-called by-pass or relief valve was to permit discharge of water in the nature of a spillway?

A. The by-pass valve installed in the plants of the Mammoth Bar Gold Mining Company and the Power Development Company, had nothing whatever to do with any kind of spillway. They were put there especially and particularly to maintain constant flow, and, therefore,

constant pressure in the conduit. Spillways are provided in portions of the system which could have been used if desirable.

Q. 1315. Referring to Defendant's Exhibit Berry Blueprint No. 1, please state the mechanical nature of the springs 5 shown in figure 1 thereof. By that I mean their signification as springs.

A. These springs are of that class known as coil springs.

Q. 1316. Are they tension springs or compression springs?

A. They are tension springs.

Q. 1317. The generator shown was rigidly coupled with annulus, 1, was it not?

A. It was rigidly coupled to fly-wheel 1.

Q. 1318. The water-wheel was rigidly coupled with the shaft 8, was it not?

A. They were so coupled.

Q. 1319. If the load decreased in the use of this device, levers 2 2 moved outwardly on the fulcrum 4, did they not?

A. They would move outward.

Q. 1320. When those levers were with their stops in contact with which they are, I take it, there shown in figure 1, the operative connection between the generator shaft and water-wheel shaft was through the springs 5, the same being under tension. Is that not correct?

A. That is not exactly correct.

Q. 1321. Were not those springs 5 part of the mechanical train between those shafts at that time?

A. They were part of such mechanism.

Q. 1322. If those springs at that moment were suddenly cut, what would occur?

A. The levers 2 2 would take their outward position, due to an unbalancing of the various loads within the mechanism, ~~it~~ being assumed that the speed remained the same.

Q. 1323. And there would be a quick relative movement or change in its position of couple between the generator shaft and the water-wheel shaft; is that not correct?

A. There would be a change, but not necessarily a quick one.

Q. 1324. Well, to the extent caused by the severing of the springs 5 there would be a destruction of this couple, would there not?

A. There would be a disturbance in the balance. In other words, there would be no balance in the mechanism and it would not operate as a governor.

Q. 1325. And would not the couple as a mechanical couple be disturbed, namely, the couple through which the generator shaft was driven by the water-wheel shaft?

A. There would be a disturbance in the balance required to maintain the speed of these two parts at the same rate.

Q. 1326. Would not a necessary part of the mechanical couple be impaired?

A. If you are referring to the "couple" as understood in mechanics, meaning rotating tendencies, it would be impaired.

Q. 1327. Then these two shafts, namely, the gen-

erator shaft and the water-wheel shaft, were in part resiliently coupled, were they not?

A. Not as that term is ordinarily understood. Springs are introduced simply to maintain balance between load changes and changes of tension in the springs.

Q. 1328. Was not the power of the water-wheel shaft imparted to the generator shaft through these springs 55?

A. It cannot be said that that was the case, for the simple reason that as the power increased the spring tension decreased, and vice versa. In other words, the spring tension at that part of the total load not being passed through the mechanism.

Q. 1329. But part of the power at times passed through those springs from shaft to shaft, or else such springs would not have been put under tension. Is that not correct?

A. The springs are introduced as a balancing element. The power did not go through those springs. As I have before stated, the spring tension could more properly be said to represent that portion of the total load which was not passing through the device.

Q. 1330. Part of the power of the water-wheel shaft in decrease of load or increase of speed, was applied to these springs to put them under tension, was it not?

A. These questions indicate a total lack of understanding of this device. The power cannot be said to go through the springs, inasmuch as the greater the power that went through the device the less the spring tension; and the less the power that went through the device the greater the spring tension.

Q. 1331. Well, I think we will show that we understand this device far better than it was understood when it was installed, and we propose to do that on the record, and I will ask again, substituting, if you will, the word "force" for "power", if part of the force generated by the water-wheel was not taken up by these springs when a change of relative speed between the generator shaft and the power shaft took place.

Mr. Westall: We object to counsel stating his ability to understand and to his testifying as to what he understands on the record. If he wishes to testify let him be sworn in the case, and if he thoroughly understands the mechanism he will have an opportunity to tell that to the court at the time of the hearing.

A. I cannot consider that any of the force or power of the wheel went through these springs, for the reasons before stated. This device depends for its operation upon centrifugal force of the levers 2 2 and the parts mounted thereon, this being met by either the load being transmitted or by the spring tension, or partly by both. As the load decreased the spring tension increased; and vice versa, when the load increased the spring tension decreased.

Q. 1332. By Mr. Blakeslee: Were the levers 2 2 and the link 6 of this device eliminated entirely, the couple of the generator shaft and the water-wheel shaft would be entirely broken and the water-wheel shaft would not drive the generator shaft at all, would it?

A. Eliminating lever 2 2 and link 6 6, there would be no connections between these members.

Q. 1333. Then can you not say that there was a flex-

ible coupling between generator shaft and water-wheel shaft?

A. There was certainly a coupling which, for its operation, might be said to be flexible.

Q. 1334. And that flexibility was opposed or affected by the tension of springs 5 5 at all times, was it not?

A. The tension of springs 5 5 forming part of this device at all times.

Q. 1335. Then, if that is so, was this coupling not a resilient, flexible coupling?

A. It was not resilient in the sense that the word is ordinarily used. It was a coupling which varied during variation of load.

Q. 1336. You say the tension was a part of the coupling device, if it was not a resilient, flexible coupling device, how would you describe it so that its coupling function would be understood to be modified by the action of springs 5 5?

A. There was certainly extension of these springs in action, but resiliency as ordinarily used implies a quick, nervous response, which did not occur in this, on account of the weight of the parts which had to move to enable these springs to move.

Q. 1337. Then was the coupling device not a tensionally controlled yielding coupling device?

A. It could be so described.

Q. 1338. Then if the generator and shaft lagged in speed and the water-wheel and its shaft increased in speed, is not the load of the generator imposed upon the wheel through a tensionally yielding or tensionally responsive flexible coupling between the generator and the

wheel, assuming the levers 2 2 to be between their extreme limits of play.

A. That would be the case.

Q. 1339. Then at such times there is a non-rigid driving relation between the wheel and the generator. Is that not correct?

A. During which there is not a rigid connection. During constant load it is virtually rigid.

Q. 1340. And during constant load and correlated constant speed no governing action takes place?

A. It does not.

Q. 1341. Therefore, during governing operation there is no rigid relation in drive between the generator and the wheel. Is that not correct?

A. That is correct.

Q. 1342. Then under those conditions, or at that time, there may be a difference between the speed of the wheel and of the generator. Is that not correct?

A. Such slight differences in these speeds is a necessity in the variation of that governor.

Q. 1343. Then at that time does the governor control the speed of the wheel or the speed of the generator? And I am speaking of this instant which we have defined in the last few questions and answers.

A. The governor operates to control the speed of both, it being the difference of speed which sets it into operation.

Q. 1344. Well, we are assuming that it has been set into operation. During this instant, which is controlled? The speed of the wheel or the speed of the generator, or driven element?

A. Both are controlled; I cannot separate them.

Q. 1345. Then the action of the governor at this instant is responsive to the effect of a speed intermediate that of the generator, and that of the wheel; is that not correct?

A. The governor at this instant is responsive especially to load change. Its very nature depends on that.

Q. 1346. But it is responsive to the condition that exists when there is a difference between wheel speed and generator speed, is it not?

A. Such difference of speed is required for operation.

Q. 1347. Then this governor acts upon and in accordance to a subtraction of speeds. Is that not correct?

A. That is not correct. It acts responsive to load changes, the slight speed change simply being that which is necessary to permit these correlated parts to move, one in relation to the other.

Q. 1348. Then the speed-change is only incidental to governor action and it primarily selects and acts in accordance with the load change. Is that correct?

A. Not altogether. The load change is the primary one. Speed changes affect it to a certain extent. In fact, the device depends upon a selected speed for its operation.

Q. 1349. Then does it act on an addition of differences between speed and load, if it does not act on a subtraction of these differences?

A. If I understand the question, subtraction of speed is required in one case and an addition of speed is re-

quired in the opposite operation to make these parts move relative to each other.

Q. 1350. Then there are two factors entering into the automatic computation of this governor in the performance of its functions. Is that not correct?

A. To what factors do you refer?

Q. 1351. To the two factors we have just considered in considering addition and subtraction thereof, namely, wheel speed and generator speed.

A. The reference is ambiguous. The two factors that I recognize in this are load change and speed change.

Q. 1352. And both of these factors enter into the automatic computation of the governor in its compensatory action? Is that not correct?

A. Both these enter into the device.

Q. 1353. Then this device is not particularly a speed-sensitive device?

A. It is principally a load-sensitive device, dependent, however, upon selected speed for the maintenance of a necessary balance in the parts.

Q. 1354. And not purely a speed-sensitive device?

A. It is not purely a speed-sensitive device.

Q. 1355. Is the device, being the fly-ball features of Complainant's Exhibits E to L, and the dynamo 8 of the Lyndon patent in suit, in each case, not a purely speed-sensitive device?

A. It is purely responsive to speed changes which follow load changes, the speed change being secondary to the load change as a rule.

Q. 1356. And the action of the speed-sensitive device in each instance is responsive to change of speed of a

single rigid shaft, is it not, namely, the water-wheel shaft?

A. The fly-ball device used in defendant's device as shown in the exhibits mentioned is a speed-sensitive and indicating device responsive to changes of speed in the water-wheel shaft, whereas in the Lyndon patent the dynamo 8 is sensitive to speed change of the water-wheel shaft, but is not an indicator thereof.

Q. 1357. And in each case such speed-sensitive device is operated from a rigid shaft, namely, the water-wheel shaft, is it not?

A. They are both so operated.

Q. 1358. Do you not think that the placing of the Lyndon by-pass valve half-way open in the specific disclosure of the patent indicates the intention of obtaining water economy conjointly with the possibility of operating the by-pass valve in either direction as may be desired, in accordance with the requirements of the case?

A. I find absolutely no desire to economize in the use of water. The intent evidently was to take care of inertia effects both in opening and closing the main water-wheel gates.

Q. 1359. However, the slow return of the by-pass to normal or selected position after it has been opened further to take care of inertia effect, must resultantly produce water economy in the by-pass, must it not?

A. There would certainly be less water flowing through it when half-open than when full open; but this feature evidently did not enter into the question. But it is necessary that this by-pass valve should return to its half-open position in order to be ready for succeed-

ing governor action as disclosed in this patent.

Q. 1360. But you will give the apparatus the credit for that saving, will you not, incidental to the return of the by-pass valve to a certain position after it has been opened?

A. It is certain that as between half-open and full open, there would be less waste of water. But there is no economy of water as ordinarily viewed in either case.

Q. 1361. In complainant's Exhibits E to L, U and V, the relief valve or by-pass valve always returns to a certain or normal position after increase has ceased; does it not?

A. As designed the valve of the auxiliary relief nozzle in defendant's device always returns to its closed position after governor action.

Q. 1362. That is in order that the by-pass valve or relief valve may prevent a succeeding ^{inertia} effect in the pipe-line upon a further closing movement of the gate, is it not?

A. That is the case, but the succeeding closing movement requiring such action, which it does not always do.

Q. 1363. It always does if that action is sufficiently rapid and the speed change is sufficiently marked to call upon the by-pass valve to prevent a dangerous inertia effect in the pipe-line. Is that not correct?

A. It would follow a sufficiently rapid closing action of the valve of the main needle nozzle in a closing direction.

Q. 1364. You mean it will accompany that closing action in a reverse direction, do you not?

A. It accompanies that action in a reverse direction.

Q. 1365. Now, supposing the springs on the dashpot, being part of the circuit from the governing mechanism to the needle of this auxiliary or by-pass valve, became dead or inert at a point slightly previous to the return of the auxiliary or by-pass needle to closed position. Upon this assumption will not the auxiliary or the by-pass needle necessarily accompany movements of the main wheel needle ^{it} inverse^y, and accompany all such movements of the main wheel or gate needle?

A. Such would not be the case inasmuch as the design of the end of the valve on the auxiliary relief nozzle is such that the water itself will complete the spring action and close the valve.

Q. 1366. That is only true when the needle head of the by-pass valve is very close to its seat, so that there is a marked choking action. Is that not correct?

A. This tendency exists more or less throughout the stroke, but especially and most strongly near closing position.

Q. 1367. Do not the auxiliary relief valves or by-pass valves of Complainant's Exhibits E to L and the allied exhibits, actually by-pass water rejected by the wheel during closing movements of the main gate needle, in accordance with your own definition of that part of the function of the by-pass valve of the Lyndon patent.

A. The automatic relief nozzle in defendant's device on a closing movement of the valve of the main needle nozzle by-passes only that portion of the water rejected by the wheel which it is necessary to by-pass to prevent excessive pressure rises in the conduit.

Q. 1368. Do you mean by that that the by-pass valve admits of discharge of only a percentage of discharge permitted by the water-gate valve?

A. That is a question of proportion.

Q. 1369. Whatever may be the nature of action of the electro-magnetic features of the Lyndon patent in suit, such as the solenoid 33 and electro-magnets 15, 16, 32 and 64, each of these devices does cause and produce resultant mechanical action, does it not?

A. Each of these electro-magnets produces mechanical movement.

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Q. 1370. Was there any particular reason why you selected the governor element connected up with both the generator shaft and water-wheel shaft as shown in Berry Blueprint No. 1 in your design, as you have testified, on the Power Development Company installation? And I am referring particularly to the showing in figure 1 of the blueprint.

A. To what governor element do you refer in this question?

Q. 1371. I mean the entire group of associated features shown in figure 1 of the blueprint.

A. The reason for selecting these elements as shown is because they fulfilled the requirements as to the nature of this governor as a transmitting dynamometer.

Q. 1372. Was there any reason why you did not select the Lombard type of governor, as then known, for this installation?

A. The selection of this type of governor was made

before my connection with the company, but it was their intention to use this when I joined them, for the water-wheel governor.

Q. 1373. What company was this?

A. The Girard Water Wheel Company.

Q. 1374. I show you a printed pamphlet or catalog and I will ask you if you know by whom it was issued, if you recognize its source.

Mr. Westall: Objected to as not proper cross-examination, and counsel is notified that if he persists in introducing new matter on cross-examination he will make the witness his own.

A. This appears to be Bulletin No. 114 issued by the Joshua Hendy Iron Works.

Q. 1375. By Mr. Blakeslee: Is that a concern that you were once connected with?

Mr. Westall: The same objection.

A. I was once connected with that concern.

Q. 1376. Do you recognize any of the devices referred to therein as being the product of this concern?

Mr. Westall: The same objection is repeated to all these questions, and the further objection that the evidence called for is incompetent, irrelevant and immaterial.

A. I recognize some of these cuts as showing devices produced by that company, and others which were never produced by them.

Q. 1377. By Mr. Blakeslee: Do you find any which were produced by that company at the time you were connected with it?

Mr. Westall: The same objection.

A. They produced a number of the gates shown on

page 15; some deflecting nozzles shown on figure 7, page 17; water motors shown on figure 13 of page 23; water motors shown on figure 14, page 24; water-wheels on pages 25, 27 and 27; friction hoist shown on page 34. I think that is all.

Q. 1378. By Mr. Blakeslee: Do you find any pictorial showing therein of the governor element which we have been discussing as shown in Berry Blueprint No. 1, figure 1 thereof?

Mr. Westall: The same objection is repeated to all this line of question. There is no such governor shown in the bulletin.

Mr. Blakeslee: We offer this bulletin or catalog in evidence as Complainant's Exhibit Joshua Hendy Iron Works catalog for 1908, and ask that it be so marked.

Mr. Westall: The offer is objected to as not proper cross-examination, incompetent, irrelevant and immaterial, and not having any tendency to prove any issue in this case or disprove any possible issue in this case.

(The said Exhibit so offered in evidence is marked "Complainant's Exhibit Joshua Hendy Iron Works catalog for 1908," together with the title of the court and cause and the date upon which the said exhibit was offered.)

Q. 1379. By Mr. Blakeslee: Now, I will ask you to please refer to Complainant's Exhibit Lyndon patent in suit, and to Complainant's Exhibit KKK, and tell me if you do not find in each of the same a water-gate-operating shaft.

Mr. Westall: Objected to as having been already covered several times in the cross-examination, and as

serving no useful purpose except that of amplifying the record unnecessarily.

Mr. Blakeslee: The question is withdrawn.

Q. 1380. By Mr. Blakeslee: Referring now to Complainant's Exhibit Lyndon Patent in Suit, and Complainant's Exhibit KKK, I will ask you if you do not find in each of the same the following combinations: A water-gate-operating shaft, a water-wheel shaft, a water-gate and auxiliary water-gate whereby water may be discharged from the penstock or pipe-line, means whereby the water-gate and auxiliary water-gate may be jointly moved by the water-gate-operating shaft inversely, a speed-sensitive device operated by the water-wheel shaft and responsive in operation to changes of speed in the water-wheel shaft, and means under control of said speed-sensitive device for operating the water-gate shaft.

A. No; for the following reasons. In the Lyndon patent the water-gates and auxiliary water-gates are jointly moved inversely at all times, whereas in the defendant's device, as shown in Complainant's Exhibit KKK, the auxiliary valve is jointly moved only part of the time. Furthermore, in the Lyndon patent the auxiliary water-gate discharges from the penstock at all times except during that extremely short interval when it is full closed, whereas in the defendant's device the auxiliary water-gate discharges from the penstock only during that short period of time when it is open, the difference in this case being vital and deciding, inasmuch as it affects the very important question of water economy.

Q. 1381. Well, it is true in both cases that water may

be discharged from the pipe-line through the auxiliary valve. Is that not correct?

A. It is not correct, inasmuch as in the Lyndon patent it "must be discharged" is much more appropriate, whereas in the other "it may be discharged" applies.

Q. 1381. In both cases water is during governor action, at least, or certain parts of governing action, discharged from the penstock by the auxiliary valve. Is that not correct? *That is correct but the comparison fails utterly*

A. ~~It is literally correct as the words go, but not cor-~~ to express conditions, inasmuch as the manner of this discharge and the amount of this discharge, both as to quantity of water and time, is entirely different in the two cases.

Q. 1382. I am trying to ask a question which states a condition common to both. Is it not a condition common to both of the valves that at a period of the governor action, and I say at "a period," water is discharged from the penstock from the auxiliary valve in each case? Is that not literally correct?

A. It is literally correct as the words go, but not correct as a statement of conditions.

Q. 1383. There is a means shown in the Lyndon patent, is there not, of operatively connecting and disconnecting an auxiliary water-gate with respect to the main water-gate, such means being actuated in the operation of the governor? Is that not correct?

A. That is correct.

Q. 1384. Now, in connection with the combination of features under discussion and as stated a few questions back, in relation to these two exhibits under comparison, both in the Lyndon patent in suit and Exhibit KKK,

show means acting to return the auxiliary water-gate to a certain position after governing action has been effected; is that not correct?

A. That is true, except that the position to which they return is different in the two cases.

Q. 1385. When the auxiliary water-gate is in operative connection with the main water-gate of the Lyndon patent an impulse will be imparted to the auxiliary water-gate when the impulse is imparted to the main water-gate? Is that not correct?

A. That is correct. This impulse is present whenever the main water-gate is moved.

Q. 1386. In Complainant's Exhibit KKK, when an impulse is imparted to the main water-gate an impulse is imparted to the auxiliary water-gate to be utilized thereby when that auxiliary gate is in position to respond. Is that not correct?

A. That is not correct, inasmuch as there is no impulse given to this auxiliary valve except when certain definite movements of the main needle take place, and not at other times.

Q. 1387. When the main water-gate in Complainant's Exhibit KKK is moved, is not an impulse imparted to the auxiliary water-gate in that exhibit which impulse results in motion of the auxiliary water-gate in a direction inverse to that of the needle of the main water-gate if the auxiliary water-gate is in position to execute such movement?

A. This will not happen even under these conditions, unless the nature of the movement of the valve of the main needle nozzle is of such a nature as to require a

movement on the part of the valve of the auxiliary relief-nozzle.

Q. 1388. Whenever the main water-gate in Exhibit KKK is moved, will not an impulse be imparted to the dashpot which controls and causes the movement of the auxiliary water-gate?

A. There is movement imparted to the piston of the dashpot whenever the valve of the main needle nozzle moves. But this does not necessarily impart motion to the valve of the auxiliary relief nozzle, which occurs only under certain particular conditions.

Q. 1389. In each of these exhibits, and as a further addition to the general combination of parts and features as now built up in the last few questions and answers, there is a returning device acting upon a part which controls motion of the water-gate-operating shaft, which returning device is actuated through a train of mechanism set into motion by the water-gate-operating shaft, so that such controlling part mentioned is returned and is influenced to tend to return such controlling part to normal position, to prevent overrunning of the governor by force applied independently of the speed-sensitive device of the general combination?

A. I will ask you to point out specifically what you refer to as the controlling feature in each of these.

Q. 1390. In the Lyndon patent I refer to the solenoid 33 and its core 34, and in Complainant's Exhibit KKK I refer to the part marked B, being the piston valve controlling the ducts through which power fluid is passed to opposite ends of the cylinder A.

A. No, for the following reasons: the question contains a reference to a returning device operated by the

water-gate-operating shaft which applies to defendant's device shown in Exhibit KKK but not the Lyndon device, inasmuch as this was set in operation by other means. Furthermore, taking the definition of "controller" as given, the returning device of the Lyndon patent does not return itself to inoperative condition irrespective of speed changes. It simply serves to distort the balance in the core 34 and does not affect the conditions in solenoid 33.

Q. 1391. In the Lyndon patent in suit if the returning device is not directly actuated by the water-gate-operating shaft, it is actuated by a shaft which operates the water-gate-operating shaft. Is that not correct?

A. My objection to this point was that while this returning device obtains power from that shaft, it is not operated by it in the sense that it is set into operation by it. It is not responsive to movement of that shaft as to nature or extent.

Q. 1392. The power to operate the returning device mentioned in the Lyndon patent in suit is taken from the shaft which in turn operates the water-gate-shaft.

A. That is true.

Q. 1393. Action of this returning device of the Lyndon patent in suit affects the core 34 of the solenoid 33 to move it or tend to move it in the solenoid, does it not?

A. It will move the core 34 of the solenoid.

Q. 1394. Action of the returning device in Complainant's Exhibit KKK moves or tends to move the piston referred to, which controls supply of power fluid to the cylinder referred to. Is that not correct?

A. Only such conditions as require a movement in the

rack of the returning device, and not under all conditions.

Q. 1395. Whenever that returning device acts, it affects such piston to move it or tend to move it, does it not?

A. It does.

Q. 1396. And in both the construction of the Lyndon patent and that of Complainant's Exhibit KKK the returning device may act, may it not, while the speed-sensitive device mentioned is acting or attempting to act? Is that not correct?

A. The returning devices in both vases will act while the speed-sensitive part is acting, having, however, entirely different effects in the two cases. The comparison is not a correct one, inasmuch as in the part designated the controller in the Lyndon patent does not of itself effect the results aimed at as other devices are required.

Q. 1397. The returning device in each case imparts an impulse to the controller part, does it not?

A. Applying the word "controller" to the core 34 of the solenoid 33, and the balanced valve in the other, which definition, however, is not a correct one in either case, I can answer that there will be an impulse imparted to these parts.

Q. 1398. Now, neither of these returning devices can act unless motion is first produced by the controller. Is that not correct? And I am referring to the solenoid and its core 34 as a "controller" in one case, and the piston valve as a "controller" in the other case, and particularly to core 34 for the present moment.

A. Without motion of these parts there would be no subsequent motions.

Mr. Blakeslee: Let the record show that the witness has not as yet produced the sketch which he was called upon to produce, showing the three cases pertinent to a lever such as that of lever 14 of the Lyndon patent. Cross-examination is closed.

Mr. Westall: Referring to the request of counsel that the present witness make certain sketches, I will ask the witness what further answer or comment he has to make on the request, before proceeding with the redirect examination.

Mr. Blakeslee: We would like to know whether this talk with the witness is redirect examination, or what it is. We do not understand that counsel can address without putting a question to him. If the witness has anything to say, it is for him to say.

Mr. Westall: This comes under the head of instructions to the witness, and has particular reference to the last statement of counsel on the record.

Mr. Blakeslee: The court will again notice that counsel for defendant seems to think it is within his province to instruct the witness, and that counsel in fact has introduced a department into the examination of this witness which may be known as the "Instruction Department."

Mr. Westall: It is also to be noted that the counsel was careful not to ask for the production of any sketches, but closes his cross-examination without giving the witness an opportunity to produce any sketches if he so desired, and in view of this precipitate action of counsel we feel that some opportunity should be accorded to the witness.

Mr. Blakeslee: Counsel may ask the witness for such explanation as he wishes as soon as he commences to re-directly examine him. The witness has had a couple of days to volunteer this sketch or any explanation.

The Witness: Being totally inexperienced in affairs of this sort, I am not aware as to the proper time to bring up this question. Having received a written copy of the question, and having gone over it carefully, I find it impossible to produce such sketches for the reason that the question involves the introduction between an electro-magnet and its armature of a bell-crank and link in one case, and a spring in the other, either of both of which are absolutely impossible and absurd.

Mr. Blakeslee: Let it be understood that the witness is now on record as to the nature of this request, so that the final record of this case may show fully what possibilities there are in this direction.

REDIRECT EXAMINATION.

By Mr. Westall:

Q. 1399. State whether or not, in your opinion, the fact that in the device of Defendant's Exhibit Lamb Patent water from the by-pass strikes the wheel after being by-passed, and in so striking the wheel performs an additional function, renders the by-pass of said Lamb patent any the less the equivalent in function and result to the by-pass of the Lyndon patent, and in so giving your answer, summarize your reasons therefor.

Mr. Blakeslee: Objected to as grossly leading and suggestive, and assuming that the water is by-passed in the Lamb device, or that any of the water is by-passed,

and, in the second place, that there is any by-pass, and, therefore and further, as not redirect examination.

A. Inasmuch as the function of the by-pass is to divert the energy which had been applied to drive the wheel forward and which was for the time being not now required, so that it would not for the time being drive that wheel forward, it can make no difference in my mind as to the further use of such energy, whether it be allowed to pass away or whether it be put to further useful purposes. It has produced the useful purpose for which it was designed—that of diverting energy from the wheel for the time being.

Q. 1400. By Mr. Westall: As to the application of the energy of flowing water to the propulsion of the wheel, and as to the provision for having an additional supply of water to throw upon the wheel when operating conditions required more water, and as to the provision for disposing of the excess water not needed at any given moment to propel the wheel, please compare the device of the Lyndon patent in suit with the Defendant's Exhibit Lamb Patent.

Mr. Blakeslee: Objected to as not redirect examination.

A. Both of these devices show clearly means for diverting water from the wheel when not required, and for having available for immediate use such additional water as may be called for at any instant to drive the wheel forward.

Q. 1401. By Mr. Westall: Please make the same comparison of the Lyndon patent with the device in use

at Bakersfield as illustrated in Defendant's Exhibit Berry Blueprint No. 1.

Mr. Blakeslee: Objected to as not redirect examination, and purely a question only proper, if proper at all, in direct examination.

A. Both the Lyndon patent in suit and the device as shown in Defendant's Exhibit Berry Blueprint No. 1, show clearly means for diverting from the wheel that quantity of water not required at any particular instant to drive the wheel forward, and for having ready for instant use such additional quantity of water as may be demanded by the wheel at any time on increase of flow.

Q. 1402. By Mr. Westall: Now, you have shown generally that the auxiliary nozzles of defendant's devices are not by-passes, in the sense that such term is used by Lyndon in the patent in suit. Please explain a little more fully why this must be so.

Mr. Blakeslee: We object to counsel testifying for the witness without being sworn, and object to his thus leading the witness and stating conclusions and suggesting to the witness and putting his own construction upon the testimony in this case.

Mr. Westall: This has already been fully developed on direct examination and on cross-examination.

Mr. Blakeslee: Counsel is not arguing the case now.

A. There is a very radical difference between the auxiliary valve shown in the Lyndon patent and the auxiliary valve shown in defendant's device. It exists in the fact that the by-pass as shown and described by Mr. Lyndon specifically is open and discharging water at all times except during that very short interval when

it may be fully closed as the result of extreme governor action. In defendant's device the auxiliary valve is open and only open during a very short interval of time such as may follow a rapid closing movement of the valve of the main needle nozzle, especially near its closing position, and thus by-passes water to a very limited extent, and only when required to prevent excessive pressure increases in the penstock. It is essentially in its own nature and use a relief valve.

Q. 1403. By Mr. Westall: You have spoken of the possibility of the valve of the device of the defendant's Exhibit Lamb Patent being prevented from properly performing its function by sand, wood or other foreign matter in the water. What have you to say as to the likelihood of the old form of butterfly valve, borrowed by Lyndon from the prior art, becoming choked by driftwood and animals, or other things getting into the pipeline?

A. The liability of obstruction to a butterfly valve from floating matter, driftwood, etc., is constant, and it is especially liable to be choked by small particles, twigs, roots, and so forth, around those portions near the stem where the opening is small and the movement not great. This danger likewise exists as to the main gates of the wheel.

Q. 1404. Suppose that someone by the exercise of inventive genius using the same number of magnets, circuits, solenoids, contacts, friction clutches, and other elements, should be able to reorganize the now uncorrelated elements of the Lyndon patent in suit so as to make the water-gate and the by-pass valve operate in the manner

contemplated by Lyndon, what would happen if during operation of the device some oil got on one of the friction clutches?

Mr. Blakeslee: Objected to as assuming an indefinite reorganization not stated, and as assuming the necessity of any such reorganization, and as indefinite in toto, and as not redirect examination. It is manifest that the question of reorganization does not enter into the action of any oil. A clutch is a clutch, no matter where it is put.

A. There would likely be slippage and a failure to perform functions.

Q. 1405. By Mr. Westall: Still, on the assumption of my previous questions, that is to say, the substitution of operative means for the inoperative mechanism of the Lyndon patent in suit, please state what result would follow if during the operation of the device the contacts at any one point became oxidized?

Mr. Blakeslee: Objected to on the same grounds, and as sweepingly assuming that the apparatus is inoperative, and as leading and not redirect examination.

A. The electrical contacts, especially those of a delicate nature here indicated, and especially in view of the fact of the large number of breaking operations which would follow on attempted use of this device, are extremely liable to failure to operate, in which case there would not be a performance of that particular part as intended.

Q. 1406. By Mr. Westall: Now, it has been the studied effort of the cross-examination, by subtle assumptions not based upon anything in the

record, and contrary to the direct and positive testimony of yourself, Mr. Cobb and Mr. Van Emon, to insinuate into the record the idea that the governing mechanism with its by-pass, as illustrated in Defendant's Exhibit Berry Blueprint No. 1, used at Bakersfield in 1896 and 1897 by the Power Development Company, was an unsuccessful experiment, and that the use of the by-pass in the installation referred to was discontinued because of failure to come up to requirements. I will ask you to please reiterate the facts so that there can be no possible misunderstanding as to the operation of the governing mechanism and the by-pass referred to.

Mr. Blakeslee: Objected to, on the first ground, that the question is purely argumentive, and in that sense is gross coaching of the witness and a drawing of the conclusion from testimony which is not for the counsel to draw at this time and place, and is a matter for the court to determine, and upon the further ground, that the question does not come properly within redirect examination. The time for counsel for defendant to adduce other witnesses on the operativeness of his several defense structures being in the direct examination. It is objected to as calling for a sweeping conclusive answer on the part of the witness, and not the proper method of proof, and a manifest attempt to inject into the record wholesale what counsel wishes to have the record show, irrespective of what the evidence and testimony make out in these respects. They speak for themselves.

A. The governor and by-pass as installed by the Girard Water Wheel Company for the Power Development

Company at Kern River performed their functions completely and satisfactorily. There was never any question to my knowledge as to the highly satisfactory nature of the governor. The fact that the governor was continued in use after the removal of the Girard wheels on account of low efficiency would show the highly satisfactory nature of this service, and the fact that the by-pass valve may have been removed at that time, or was not used after that time, does not come into the question at all for the simple and very strong reason that the Tut-hill wheels which immediately succeeded the Girard wheels in this plant did not require and could not use a by-pass valve located as this one was originally, for the reason that the deflecting plates used on the wheel performed this function.

Mr. Blakeslee: We ask that the answer be stricken out as a mere matter of hearsay, in view of the previous testimony of the witness as to his actual knowledge of what occurred at this installation, and at the Power Development Company plant under consideration.

Q. 1407. By Mr. Westall: A great many questions have been asked you as to the efficiency of the water-wheels. Please state whether or not the Lyndon patent shows or describes a water-wheel or refers in any manner to the subject of efficiency of water wheels in the specifications or claims in the sense that the term is usually understood.

A. The references to the water-wheel in the Lyndon patent specifications are very brief and they, with the drawings, are intended to indicate merely that there is a water-wheel which is to be governed. There is no ref-

erence whatever to efficiency of water-wheels, or to the particular construction. It is not shown in the patent.

Q. 1408. Suppose that the impractical and inoperative mechanism of Lyndon were substituted by practical and operative mechanisms to control the by-pass and water-gate as aimed at by Lyndon, and suppose that such re-invented device had been substituted in place of that illustrated in Defendant's Exhibit Berry Blueprint No. 1 as having been used by the Power Development Company at Bakersfield in 1896 and 1897, would the substitution have affected in any way the changes that were made in wheels at the plant referred to, or would it in any manner have affected the question that arose concerning the efficiency of the wheels?

Mr. Blakeslee: Objected to as calling purely for a conclusion and being based upon an assumption to further invention or the necessity therefor, and as amounting to a negative pregnant in the respect that the question assumes that the substitution would be for the Lyndon construction of itself.

A. Such substitution would in no way have affected the questions which arose as to the efficiency of wheels installed at the Bakersfield plant, and which question was the only one which was under consideration when these wheels were discarded.

Mr. Blakeslee: We ask that the last portion of the answer be stricken out as merely hearsay, the previous testimony having in no way shown that the witness had anything to do with the substitution of wheels but quite the contrary.

Q. 1409. By Mr. Westall: Counsel has suggested

on cross-examination certain changes in the ropes numbered 51 in figure-5 of the Lyndon patent in suit which, if made as suggested, would (departing from the plainly expressed limitation of the specification of the Lyndon patent in suit that the by-pass valve should be normally *half* (left-open) require that valve to be normally closed. Please point out, in a general way, what further difficulties the requirement of such change would place in the way of an inventor seeking to reorganize the uncorrelated parts of the Lyndon device into an operative mechanism.

Mr. Blakeslee: Objected to as being purely an attempt to impeach the testimony on the part of counsel, and mainly ^{intending} constituting a conclusion based upon the patent and otherwise conclusions arbitrarily drawn from the disclosures of the patent and conclusions as to the requirement of any invention to do certain things, and, furthermore, as leading and suggestive, particularly in that it presupposes difficulties. It is for the testimony to show any difficulties, and not for counsel to inject them into the record.

A. As I have clearly stated in direct examination, an attempt to so change the intent and mechanism as shown in the drawings of the Lyndon patent so that the by-pass valve 48 could be made to assume a closed position as its normal position instead of the half-open position, there would be encountered the necessity of totally changing the circuit which is shown as controlling the movements of this by-pass valve in both directions, and in the provision of other means for controlling these movements. The present single circuit with the cut-out

device shown at 74 75 could not be used in such a case, as this cut-out device would open and there would not be necessary return movement to close it, ready for subsequent action. The devices shown positively require this return movement to greater or less extent in order that contact shall be re-made at 75, in order that further action can take place.

Q. 1410. By Mr. Westall: What have you to say as an achievement of the result expressed by the specifications of the Lyndon patent in suit to be the object of the device of that patent, if any vital change is made in the mechanism which would allow or permit or require the normal position of the by-pass valve to be closed?

A. The specification states clearly and distinctly on page 4, line 35, "normally the gate or valve in the by-pass will be half-way open, so that the amount of water flowing through the by-pass and around the wheel without doing work will be half the amount which the by-pass is capable of carrying." In view of this clear and distinct statement, and in view of the general intent expressed in the specification that the inertia effects have to be taken care of both on opening and closing of the main water-wheel gates, any such departure such as would require this by-pass valve to be closed as a normal position, would clearly and positively depart from the fully expressed intent of the specifications.

Q. 1411. What is inertia?

A. Inertia is defined as that quality of a body which maintains it in a position of rest or motion unless acted upon by some force. This can be more clearly understood by a reference to an example. If we have a body

of a given weight moving at a velocity of 5 feet per second, it will contain a definite amount of energy. Should this body be made to move at a velocity of 10 feet per second, it will contain four times the amount of energy than it contained in the previous case, as this energy is in proportion to the square of the velocity. Should we desire to change the velocity from 5 feet per second to 10 feet per second, we must put into that body the difference in the amounts which they contain at their respective speeds. Furthermore, should we desire to check the velocity of this body from 10 feet per second to 5 feet per second, we must take from it the same amount of energy we put into it to increase the velocity. In the first case we accelerated the body by putting energy into it; in the ~~second~~ second we retarded it by taking the energy from it. Acceleration and retardation differ only in direction of change, and the amount of energy change is the same in either case, provided the weight is the same and the velocity change in both cases is equal.

Q. 1412. Please explain the problems of the inertia effects of water, in a general way, confronting an engineer in designing or installing a pipe-line, giving special reference to the Lyndon patent in suit, and methods by which Lyndon endeavored to solve the problem.

A. To understand more clearly this question of inertia effects of pipe-lines, I will start at the foundation. Gravity is that manifestation of nature which gives to bodies the quality we call weight, which weight, when opposed produces pressure, and when not opposed produces motion, combining pressure and motion in accordance with the degree of opposition. Gravity is therefore

at the foundation of the conditions found in a pipe-line filled with water under pressure, and is the source from which these pressures and movements are obtained. When the gates at the lower end of the pipe-line (supposed for the moment not to contain any other outlets) is in a closed ~~condition~~^{state}, full gravity effect is shown in pressure, the opposition in this case being complete. On opening this gate, the opposition is decreased and pressure drops, and the movement starts, and increases in proportion to the opening of the gate and dropping of the pressure. On the other hand, this gate being opened and the water in motion, a closing act on the part of the gate increases the opposition to the action of gravity, which decreases the movement of the water and increases the pressure. In this case, as before pointed out in the example covering inertia, when we change the flow of water from the slower to the higher velocity, there must be energy put into that water to produce the motion, and, likewise, when we change the flow of the water from a higher to a lower velocity there must be energy taken out of the water. Furthermore, with a given weight of water and a given change in velocity, the amount of energy involved is the same in both cases. Viewed from the standpoint of Mr. Lyndon, that integrity of the governing action was the paramount issue, he was perfectly correct in assuming that it was necessary to consider these inertia effects both on opening and closing of the main water-wheel gates. He clearly recognized these effects in both cases, although his statement of the case is not strictly correct. The confusion which seems to exist in the minds of some on this point, evi-

dently arises from a disregard of fundamental laws pertaining to this subject. The confusion has evidently arisen from the fact that the inertia effects following a sudden and large closing action of the gate produces dangerous pressures, and is likely to produce severe damage to the plant; whereas, inertia effects following opening of the gate tend to an increase in safety, in so far as the first result is concerned, and, furthermore, to the fact that under conditions which exist in many plants it is easy to obtain the full inertia effect following closing of a gate, as it is possible under these conditions to suddenly and fully check the flow of the water, while in the case of the opening gate sudden in nature and large in extent the inertia effects follow in relation to the head or pressure on the gate. With a head equal to the ram pressure produced by closing, there will be an equal drop in pressure following an equal change in velocity in the flow of the water. Should there not be sufficient head, the acceleration must wait for a greater lapse of time, which, while it shows a less pressure variation from normal, yet by this greater time required will have about the same effect on governing as the excessive ram. From these statements it is clear that equal velocity changes on opening and closing of the gates will produce equal disturbance in the governor, and Mr. Lyndon's view of the question is the correct one so far as its effect on governing is concerned. Whereas, in those cases where economy of water must be taken into account, the principal effort is to prevent excessive pressure rises which endanger the pipe-line and are likely in extreme cases to result in severe dam-

age. The two viewpoints are radically different, and the one which will be selected will depend on which one predominates in the mind of the designer, it being clear that the question hinges on water economy, inasmuch as means to prevent inertia effects in both directions of water-wheel gate movement will also take care of these excessive pressure rises. Devices, however, to take care of these inertia effects in both directions necessarily involve the use of a more or less constant flow of water in the conduit. Mr. Lyndon has provided for such constant flow, but in such manner that it involves a serious waste of water, and when carried to the fullest extent of his intention it will involve the use on full load of the wheel of an equally great amount of water flowing through the by-pass in addition to that used on the wheel. The devices used at Bakersfield provided this constant flow of water in the conduit, but in such manner that the total quantity of water used did not at any time exceed that required by the wheel at full load. The defendant's device was evidently intended and does operate in accordance with the idea that the saving of water is an important element in the design of the plant, and is so arranged that excessive pressure rises are prevented, other means being provided for satisfactorily governing the speed of the wheels.

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Q. 1413. Supposing that the actuating springs similar to those shown in Complainant's Exhibits U and V, were left out of construction. State what the effect would be on the operation of the auxiliary nozzle.

A. The valve of the auxiliary nozzle would close from the action of the water upon it. The springs are put in to make this a little more certain. There is a closing tendency on a needle valve constructed in accordance with the exhibits mentioned.

Q. 1414. You stated "the devices used at Bakersfield provided this constant flow of water in the conduit, but in such manner that the total quantity used did not at any time exceed that required by the wheel at full load." Please state whether or not that was true with the installation at the Mammoth Bar Gold Mining Company which you have testified concerning on your previous examination.

Mr. Blakeslee: Objected to as not cross-examination, and leading.

A. This is true in regard to the installation at the Mammoth Bar Gold Mining Company, as the device there in its essential features was exactly like that at the Bakersfield plant.

Q. 1415. By Mr. Westall: As to the use of air chambers at and prior to 1896 and 1897, and at the present time, please state how generally air chambers have been used to prevent the damaging effects of inertia in pipelines, and also state in a general way what theories have been held and are now held regarding such use.

Mr. Blakeslee: Objected to on the ground that the witness is not qualified, having testified that he knows of no such use for the last five years, at least, in accordance with his testimony, and practically for the last ten years; and on the ground that it is not the proper method

of proof and calls for a conclusion on the part of the witness.

A. About the time stated, namely, 1896 and 1897, including the preceding and following years, the use of air chambers was considered to be a good thing for preventing extreme pressure rises in the conduit. But in the use of these, they have certain defects which have gradually eliminated them from consideration. I refer to the fact that the air supplied to these air chambers was absorbed by the water, especially as the pressure became higher and higher in the install^{ations}ments. The danger of this was that due to neglect on the part of the operators, these chambers gradually filled up with water and failed to perform the function for which they were installed. During later years other means have been gradually substituted for air chambers as being less subject to serious disturbance from neglect on the part of operators, so that at the present time such devices are seldom or never discussed for such purpose.

Q. 1416. By Mr. Westall: On your cross-examination several assumptions on the part of counsel that the air chamber in use at Bakersfield was a Cobb regulating device, were permitted by you to go without challenge. Please state whether or not you know what kind of an air chamber was in use at the Bakersfield plant in 1896 and 1897.

Mr. Blakeslee: We object to this as a further coaching of the witness and as a misrepresentation of the record entirely. No such assumption was advanced by counsel. On the contrary, the record shows that the witness testified directly that the installation at the Power

Development Company plant included a Cobb pressure regulating device, and the record further shows that unlawfully and improperly counsel and another person in the room associated with the intervening defendant in this case, coached and prompted the witness and attempted to correct him in violation of all rules of practice and of fairness and integrity, and that it is manifestly the desire of counsel for the defendant to force the witness, if he cannot lead him, into certain testimony contrary to that which he directly and unqualifiedly gave in regard to the Cobb pressure regulating device at this plant.

Mr. Westall: This is no time for an argument on the question proposed by counsel. His suggestions will be fully answered on the hearing of the case.

A. At the time these questions were asked me, my mind was engaged with the question of the air chamber in general and I did not understand that there was any question as to a particular variation in detail as between air chambers; and, furthermore, the very close association with Mr. Cobb of the designer of this plant gave him the impression during the last month or two during which time this plant was under general consideration that this was a Cobb device, and I so identified it on the blueprints without making the close detailed examination which was necessary to fully determine the question. On further examination of these photographs they do not show those particular details ordinarily associated with Cobb pressure regulating device.

Mr. Blakeslee: We move that the answer be stricken out and withheld from consideration for the reason

above stated, and as devoid of character qualifying it for consideration, in view of the proceedings of counsel for the defendant as above outlined.

Q. 1417. By Mr. Westall: At the time the air chamber so referred to as having been put in use in Bakersfield in 1896 and 1897, state whether or not it was known what kind of a governor would be used.

Mr. Blakeslee: Objected to as indefinite and not the best evidence and not redirect examination.

A. Inasmuch as general design of plants of this nature must precede detailed parts, and inasmuch as no immediate knowledge of those devices was contemplated, I would regard it as extremely probable that this air chamber was made a part of the design, regardless of the nature and character of the water-wheels and governors which were to be installed in the plant. It would be a secondary safety device in any case or for any type of wheel or governor.

Q. 1418. By Mr. Westall: Supposing that the impractical and inoperative device of the Lyndon patent were ~~submitted~~ ^{submitted} by a practical and operative governing device which would move the water gate and by-pass valve as Lyndon contemplates in the patent in suit, and suppose that such operative mechanism had been selected for use in Bakersfield. From your knowledge of the development of the art at that time, and from your knowledge of the general use of air chambers, please state whether or not in your opinion an air chamber would have been used at Bakersfield.

Mr. Blakeslee: Objected to as merely calling for a conclusion or guess, and as based upon conclusions and

statements of counsel, and not being a question; and furthermore, as being absolutely meaningless inasmuch as the substitution part of the question turns the very question upon itself.

A. There is no doubt in my mind but what a substitution of an operative device following the general principles of the Lyndon patent, for the installation actually made at Bakersfield, would have required the use of a secondary safety means such as the air chamber was considered at that time, and the desirability of such secondary safety device would have been very much greater with the substitution than in the actual installation for the reason that there are very many more parts involved in the correct reverse operation of the by-pass valve in relation to the main water-wheel gates than there was in the Girard installation as actually made.

Q. 1419. By Mr. Westall: There has been an attempt on cross-examination to distinguish between the various governing devices described in your testimony, on the ground that some of them used the water of the pipe-line to direct and control the motion of valves, pistons, and so forth, and otherwise use other means such as oil dashpots and such as the attempted use of electrical means in the inoperative mechanism of the Lyndon device. Please state whether or not the installation at Bakersfield used water from the pipe-line or used such other means.

Mr. Blakeslee: Objected to as leading, and based upon assumptions of counsel which he wishes to have considered as testimony, and as not redirect examination. The time to go into the construction and opera-

tion of this purported apparatus which was taken out about as soon as it was put in at Bakersfield was on direct examination of this witness.

A. In the installation as originally made an attempt was made to use water under pressure from the conduit for operating the hydraulic cylinder employed to move the main-water-wheel gates and the by-pass valve. This was taken as the result of very positive statements that the water contained no foreign matter. After installation it was discovered that this water contained a considerable amount of foreign matter which interfered with the operation of the balanced valve controlling the flow of this water to the hydraulic cylinder. It was therefore decided to substitute the use of oil for this water, and this was done by driving a pump from the water-wheel shaft which forced oil into the lower part of the receiver which contained in its upper part air, and which oil was passed through the balanced valve to operate the piston controlling the movements of the water-wheel gates and by-pass valve. Water under pressure when clear is suitable for this work; but when it contains foreign matter, unless such can be fully removed, it is not suitable for such purpose, and the use of oil under pressure has become quite general. This, as with all other features of power plant design, has developed gradually and in accordance with conditions as found.

Q. 1420. By Mr. Westall: In your previous testimony you have mentioned certain errors in the specification of the Lyndon patent in suit. I will ask you to please state if in your opinion one could thoroughly understand the device of the Lyndon patent in suit without

discovering these errors in description and in lettering.

Mr. Blakeslee: Objected to as a statement of conclusion, calling for a conclusion, as not redirect examination, and counsel has already fooled with the witness over this question of errors or alleged errors on direct examination, and we do not see that there is any propriety in continuing that indefinitely; and the witness has furthermore testified on cross-examination that he fully made out the intentions and objects of the Lyndon patent disclosure and the operation thereof prior to testifying in this case.

A. The numerous errors and inconsistencies in the specifications as between these and the drawings, and likewise between various views of the drawings, made it necessary to correct such errors before a clear understanding could be had of the device as shown in the Lyndon patent. These errors add to the labor of such understanding, but did not prevent the final complete and thorough understanding of the device and its intended operation. The provision of Complainant's Exhibit C in this connection would make the understanding of this device much easier, inasmuch as it eliminated these discrepancies and presented the matter shown in figure 1 of the Lyndon patent in a much clearer manner.

Q. 1421. By Mr. Westall: On cross-examination you were asked the following question: "Referring to Complainant's Exhibit Lyndon Patent in Suit, and Complainant's Exhibit KKK, I will ask you if you do not find in each of the same the following combination. A water-wheel shaft, a water-gate, an auxiliary water-gate whereby water may be discharged from the penstock or

pipe-line, means whereby the water-gate and auxiliary water-gate may be jointly moved by the water-gate-operating shaft inversely, a speed-sensitive device operated by the water-wheel shaft and responsive in operation to changes of speed in the water-wheel shaft, and means under control of said speed-sensitive device for operating the water-gate shaft.”

Referring now to the device used at Bakersfield by the Power Development Company in 1896 and 1897 as illustrated in Defendant's Exhibit Berry Blueprint No. 1, and in Defendant's Exhibit Cobb Blueprint No. 1, please compare the combination of elements described in the question referred to with the devices in use at Bakersfield as illustrated by the exhibits referred to.

Mr. Blakeslee: Objected to in as far as the quotation may be at variance with the record in the case.

A. With the exception of the word “may” used in connection with the auxiliary water-gate which should be “must”, both in the Lyndon patent and in the device used at Bakersfield, I find this combination in the Bakersfield device as shown in Defendant's Exhibit Berry Blueprint No. 1, and Defendant's Exhibit Cobb Blueprint No. 1. The word “must” has been substituted for “may”, as being applicable to both cases, whereas “may” is not.

Q. 1422. By Mr. Westall: I will ask you to please point out in the exhibits referred to, and you may also refer to the photographic exhibits illustrating the devices in use by the Power Development Company at Bakersfield, the parts of the construction referred to which

bring it within the description of the combination referred to in my last question.

A. Referring to the various exhibits connected with the Bakersfield plant, I find the water-gate-operating shaft at 32 in Defendant's Exhibit Berry Blueprint No. 1; at S in Defendant's Exhibit Cobb Blueprint No. 1; at S in Defendant's Exhibit XX. The water-wheel shaft is found at 8 in defendant's Exhibit Berry Blueprint No. 1 is shown in Defendant's Exhibit Cobb Blueprint No. 1 as being that part on which is mounted fly-wheel B and which is shown as entering the hollow water-gate shaft S. It is also shown at certain places, but not marked, in some of the other exhibits. The water-gate is shown at 38 and 47 in Defendant's Exhibit Berry Blueprint No. 1; in Defendant's Exhibit XX they are attached to the stems T. The auxiliary water-gate is shown at 41 in Defendant's Exhibit Berry Blueprint No. 1; at J in Defendant's Exhibit Cobb Blueprint No. 1; at J in Defendant's Exhibit XX, and also at J in Defendant's Exhibit "Interior of Power Development Company's Power House."

"Means whereby the water-gate and auxiliary water-gate may be jointly moved by the water-gate-operating shaft inversely" is shown in Defendant's Exhibit Berry Blueprint No. 1 in the combination of levers and links 31 33 36 40 and 49, and the parts attached to them. In Defendant's Exhibit XX such parts include the lever R and levers attached to the stems T, the link U and the lever K.

"The speed-sensitive device operated by the water-wheel shaft." This is found in the speed sensitive ele-

ment of the governor shown in Figures 1 and 3 of Defendant's Exhibit Berry Blueprint No. 1, and which is shown in Defendant's Exhibit ZZ, being those parts within the fly-wheel B.

"Means under control of said speed-sensitive device for operating the water-gate shaft" are found in Defendant's Exhibit Berry Blueprint No. 1 in the levers, links, and so forth, 9, 12, 13, 14, 17, 19, 20, 21, 22, 23, 24, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 40, 49 and 42. In Defendant's Exhibit Cobb Blueprint No. 1 such parts are found at H, I, M, N, O, P, Q, R, S, T, U and K. In Defendant's Exhibit XX such parts as show include the links levers and so forth, M, N, O, P, Q, R, S, T, U and K. In Defendant's Exhibit ZZ such parts as are shown and marked are H and I and V.

Mr. Westall: Redirect examination is closed.

RECROSS EXAMINATION.

By Mr. Blakeslee:

Q. 1423. No matter to what extent or in what manner the by-pass of Defendant's apparatus is a relief valve, it participates in the governing action of the complete apparatus, does it not?

A. It participates in such action when the action has called for movement on its part.

Q. 1424. And it acts at certain times to prevent over-velocity of water at the gate or main wheel needle, such as the sudden closing action of the latter? Is that not correct?

A. That is an incidental result. The main result aimed at being to prevent excessive pressures.

Q. 1425. However, that prevention of over-velocities does take place in the action of the relief valve?

A. That takes place. Such result occurs.

Q. 1426. You have spoken of certain energy being added to the water on closing of the main water-gates. You do not mean to imply that energy is added, do you, but rather that potential energy is turned into kinetic energy?

A. I did not testify that energy was added to the water on closing the gate. When the gate is closed and the flow of water is checked, there is in accordance with the explanation of inertia a taking out of energy from the water.

Q. 1427. Well, on opening the gate, is any energy added to the flowing water?

A. It is necessary to add energy to the water so that it may flow faster.

Q. 1428. In the operation of the apparatus disclosed in Defendant's Exhibit Lamb Patent it is not correct to say that any water at all, and in any respect, is diverted from the wheel as such, is it?

A. It is certainly correct to say that it is diverted from the wheel in the driving sense.

Q. 1429. But such an unqualified statement as to diversion would not be correct?

A. It is absolutely correct, as diversion must be applied in relation to water-wheels as it concerns driving relation.

Q. 1430. No matter where water strikes the wheel in this Lamb device, it exerts a driving tendency in one direction or the other, does it not?

A. It exerts a driving tendency or retarding tendency, depending on which side it is applied.

Q. 1431. No matter which side it is applied on, the tendency is a driving tendency, is it not, without specifying in which direction the driving tendency turns to rotate the wheel?

A. There is a tendency to move the wheel in both directions, the resulting movement depending on which tendency predominates. But in such extreme case the wheel would be driven by that water.

Q. 1432. And if all of the nozzles of the Lamb device were cut off with the exception of nozzle 8 the wheel would be driven by the water passing that nozzle; is that not correct?

A. This would not be the device shown in the Lamb patent.

Q. 1433. Then, to clear up this question of diversion or non-diversion of water from the Lamb patent wheel, it is proper to say, is it not, that whatever definition is given to the word "diversion", all of the water is active and potentially applied to the wheel?

A. All of the water is actively applied to the wheel, some in one direction and some in a counteracting direction.

Q. 1434. Every hydro-electric or steam-electric power plant has numerous switch contact devices in it, has it not, such as those of a knife switch on the switchboard?

A. A small plant will have a few of these; a large plant will have more. But these do not operate at frequent intervals.

Q. 1435. However, it is necessary to keep the contact surfaces bright in order to keep the electrical paths properly open, is it not?

A. It is necessary that these shall be maintained in normal condition to subserve their purpose.

Q. 1436. And preventing or removing oxidation of contacts is well understood and enters into the proper upkeep of all plants and devices involving the use of contact surfaces?

A. This is understood, and is part of the duties of the operator, to the extent to which it is necessary.

Q. 1437. This is understood just as fully as keeping bearings in line and oiled, and various other adjustments and upkeep operations required in purely mechanical installations?

A. It is just as well understood, and in some cases better understood, inasmuch as it is called to attention more frequently.

Q. 1438. The danger of getting oil on clutch co-engaging clutch surfaces is present in any apparatus using such friction clutches, is present in automobile drives and other well-known and widely used clutch constructions, is it not?

A. In cases where the clutch is designed to operate dry surfaces, such danger exists.

Q. 1439. Are you familiar with the study and analysis of U. S. letters patent?

A. I have had some experience in this line in my own work.

Q. 1440. You never expect to find in any one letters patent drawings or descriptions of each and every form

or embodiment of the invention which may be possible within the fair interpretation thereof, do you?

A. I would naturally expect specifications and drawings to show the disclosure intended by the inventor, and especially to show that which he desires to protect by letters patent.

Q. 1441. Don't you know that the claims are possibly more broadly considered in determining the scope of letters patent than the specific disclosure in drawings and descriptions of the one form usually shown in the patent?

Mr. Westall: Objected to as assuming to have the witness usurp the functions of the court, as the interpretation of a claim is purely a legal matter.

A. As I understand, the specifications and drawings show the intent of the inventor clearly and unmistakably, and that the use of the claim is to clearly point out those particular things which he considers new and which he desires to protect by letters patent.

Q. 1442. By Mr. Blakeslee: I have asked this question particularly in view of your extended treatment in direct examination of the claims of the Lyndon patent in suit. Now, as an example of what I am getting at, referring to Claim 6 of the Lyndon patent in suit, you find therein "a by-pass for the water-wheel." Now, that claim itself does not specify the structural nature of that by-pass, does it?

Mr. Westall: I object to counsel arguing matters of law with the witness.

A. Those few words do not describe the particular structure shown in the specification.

Q. 1443. By Mr. Blakeslee: And the by-pass valve or relief valve which you have testified about as having been put in at the Power Development Company plant would not be suitable for consideration in connection with this statement of Claim 6 of the Lyndon patent in suit if that term "by-pass" were limited in definition to the butterfly valve 48 of the Lyndon patent in suit, would it?

A. In this, as in all other cases, it is necessary to know what was meant when the word was used; and whether any other particular form could be substituted or not would depend on how closely it fulfilled the conditions.

Q. 1444. In other words, it would be a question of whether you got similar results with means performing the same function? Is that not correct?

A. Provided the means were about the same. It is the intent of the inventor which controls in such cases.

Q. 1445. And you find, for instance, in referring to Claim 3 of the Lyndon patent in suit, the following language, do you not: "A controller for said operating means, responsive to changes of speed of the water-wheel." There is a radical difference in design, is there not, between the speed-sensitive device, being the dynamo 8 of the Lyndon patent in suit, and the device shown in figure 1 of Berry Blueprint No. 1, which was operatively connected with both the generator shaft and the water-wheel shaft, in accordance with your testimony?

Mr. Westall: This line of questioning is objected to as not proper cross-examination. It is attempting to go

back into the record on matters which should have been covered in cross-examination.

Mr. Blakeslee: It will be noted that counsel went into matters of analysis of the patent in suit on redirect examination.

A. I see no such connective relationship in this question which would permit an answer, inasmuch as the use of the word "controller" in the Lyndon patent is limited usually or always to a particular element, such as the lever 26, and cannot therefore be compared with the device shown in general in figure 1 of Defendant's Exhibit Berry Blueprint No. 1.

Q. 1446. By Mr. Blakeslee: There is no such controller shown in that blueprint, is there?

A. There is no part which performs the functions of lever 26 of the Lyndon patent.

Q. 1447. Well, the Lyndon patent shows a speed-sensitive device, namely, the dynamo 8. There is nothing shown in Berry Blueprint No. 1 which corresponds with this at all, is there, unless it be the subject of figure 1 of that blueprint, without definitely considering the extent to which such subject of figure 1 may parallel the function of dynamo 8.

A. There is no such dynamo used in the Bakersfield plant, the dynamo being only a part of the mechanism which is necessary to feel and indicate changing conditions in the mechanism.

Q. 1448. And of course, the dynamo 8 produces changes in operative conditions in the other parts of the apparatus, does it not?

A. It produces changes in the apparatus following it in the cycle.

Q. 1449. Now, when were you last at the Power Development Company plant testified about?

A. As I remember, it was the year 1897.

Q. 1450. As late as August of that year?

A. I do not remember the month. My most distinct recollection is that it was warm weather.

Q. 1451. Now, referring to the Lyndon patent in suit again, no more than one electrical circuit such as 105 would be necessary to energize the electromagnet 64 to operate the by-pass valve 48, no matter what was the desired or preferred normal position of the same, providing the ropes 51 and 52 were properly adjusted in connection with the pulley or sheave 54, as by means of the turnbuckles in such ropes, and provided the pins 73 were properly set so as to trip the circuit-breaker 74 75 at the proper point in the movement of the by-pass valve. Is that not correct?

A. There is no possible way of setting the pin 73 to enable a single circuit to be used and to enable the by-pass valve to be set in any position for normal.

Q. 1452. Isn't it a question of relation between the lengths of the rope or rope-parts 51 52, the preferred normal position of the by-pass valve 48, and the relation of the pins to the phases of rotation of the sheave 54?

A. These questions do not touch the vital points of this device at all.

Q. 1453. —which is—

A. Which is that for circuit 105 to perform its func-

tion in succeeding governor action it is necessary that contacts shown at 75 should be closed.

Q. 1454. Is it not clear to you that this circuit-breaker 74 is not necessarily operative in connection with that movement of the by-pass valve 48?

A. It is operated only when the by-pass valve approaches either full open or full closed, as described in the specification.

Q. 1455. Supposing the circuit-breaker were eliminated. Then could not a single circuit actuate the by-pass valve that energizes electromagnet 64, said by-pass valve being set by adjustment of the ropes 51 52, as through their turnbuckles, so that by-pass valve should assume a different normal or preferred position?

A. It would be too dangerous an operation to attempt, inasmuch as there would be nothing to stop this movement at the limit.

Q. 1456. Well, let us assume, then, that the return-ing device including clutch 22 23 and the parts connecting through the same upon the lever 26, also prevented such extreme movement of the by-pass valve by opening the electric patch through the circuit 105, at the contacts 100, 101, 103 and 104. Would that danger element not be eliminated?

A. There is absolutely no way of obtaining such result in the mechanism as shown.

Q. 1457. Is not that the intention or part of the intention disclosed in the patent in suit?

A. It is not, inasmuch as it has clearly provided for contact breaking at 75.

Q. 1458. Is not the other contact breaking clearly disclosed as an operative intention of this apparatus?

A. The other contact breaking is shown, but there is nothing to connect it with the limited movement of the by-pass valve 48.

Q. 1459. But that other contact arrangement absolutely controls energization and de-energization of electromagnet 64 which causes the operative connection of by-pass valve with the water-gate-operating shaft 20. Is that not correct?

A. It controls the flow of current through electromagnet 64, but there is absolutely nothing to indicate action at contacts 100, 101, 103 and 104, at the time when the by-pass valve 48 reaches its limit. Furthermore, when the capacity of this by-pass is made in accordance with the disclosure, this breakage^{ing} of contact at 100 101, 103 104, would not take place when the butterfly valve 48 reaches its limit.

Q. 1460. But the breaking of the circuit in that manner in the contacts 100 101 and 103 104 may, within the disclosure of the patent and the very intent thereof, occur before the limit of such by-pass valve from the preferred position is reached. Is that not correct?

A. That is the intent on certain conditions, but the maximum provided does not even guarantee that.

Q. 1461. Then eliminating from consideration extreme movement of the by-pass valve, the circuit-breaker 74 75 could be entirely eliminated, together with the pin 73, as part of the means controlling the action of the by-pass valve. Is that not correct?

A. Eliminating the safety feature for which this device was installed, the valve would be controlled without.

Q. 1462. And you have a still further safety feature provided in the provision of the parts 76 and 77 which break the circuit at 84, 85, 86 and 87, which circuit controls the electromagnets 15 and 16 to entirely terminate any possible operation of the by-pass valve and the water-gate valve on over-movement of the same, have you not, disclosed in this patent in suit?

A. The safety device shown at 76 and 77 has nothing to do with the by-pass valve as limiting its movement.

Q. 1463. But it limits the amount to which the shaft 20 which operates the by-pass valve can be rotated, does it not?

A. This safety device goes into operation when the main water-wheel gate reaches its limits, and has no connection whatever with the movement of the by-pass valve.

Q. 1464. Doesn't it absolutely control movement of the by-pass valve to the extent that it stops such movement when the rotation of shaft 20 is stopped?

A. It stops all movement but it is not in accordance with any movement on the part of by-pass valve 48.

Q. 1465. But it prevents movement of by-pass valve 48 after such operation, does it not?

A. It prevents such movement, but it is not dependent on by-pass valve movement for its operation.

Q. 1466. But it follows by-pass movement in its operation, does it not?

A. There is no necessary connection between them whatever.

Q. 1467. But it follows such by-pass movement does it not, in its operation, namely, the circuit-breaking means at 84, 85, 86 and 87?

A. It does not follow by-pass movement any more than it can be said to follow every other movement in the device.

Q. 1468. But does it not follow that movement as well as following water-wheel gate movement?

A. I have stated repeatedly that it has not any connection with the by-pass valve movement.

Q. 1469. That is not the question. I am asking you if this circuit-breaking means is not consequent in its action upon operation both on water-gate and by-pass valve.

Mr. Westall: Objected to as having already been fully answered by the witness, and amounting to a mere senseless repetition.

A. The operation of this safety device follows movement of the main water-gate to its extremities and has absolutely nothing to do with the movement of the by-pass valve.

Q. 1470. By Mr. Blakeslee: But when it operates it prevents further movement of the by-pass valve and of the water-wheel gate, does it not?

A. It prevents all further movement in this mechanism.

Q. 1471. The closing tendency of an auxiliary valve or relief valve, as you have called it, in defendant's mechanism, and whether or not such closing tendency could manifest itself, would depend upon the adjustment of the screw valves or valve screws in the dashpot, de-

termining the circulation of confined fluid within the dashpot which actuates the auxiliary valve, thus determining the rate of such closing tendency or even the possibility thereof. Is that not correct?

A. This is not correct, inasmuch as the adjustment of the adjusting screws, while it controls the rate at which such closing action would take place has nothing whatever to do with the ultimate closing of that valve.

Q. 1472. But if these adjusting screws or valve screws are turned down so as to retard the circulation of confined fluid in the dashpot to the limit of possibility, any tendency of the relief valve to become seated, particularly under action of the water relieving such valve, would be a tendency accompanied by extreme tardiness and lack of responsiveness. Is that not correct?

A. I will ask to what extent you intend this extreme to go, in the above question.

Q. 1473. Well, you can consider that in any way you wish to qualify it in your answer as to the extreme or degree of such tardiness.

A. There is only one position for these screws which would prevent this final closing, and that would be that they should be absolutely tight and have no leakage, a condition which is foreign to the intent of the device and would not be permitted to exist.

Q. 1474. You do not know for a fact whether or not it exists in the installation of the defendant?

A. I have not seen the installation of the defendant. I would not, however, expect to find such condition in an operating device.

Q. 1475. Now, in this construction under discussion

is it not possible to set the auxiliary valve at a predetermined position with relation to the main needle valve or water-gate needle, resulting in a certain position of the piston within the dashpot, and to then turn down the adjusting screws clear home, assuming them to be turned down and absolutely seated, and in that way setting up a fixed relation between the main gate needle and the auxiliary needle which will be maintained in inverse movements of these needles?

A. Such adverse movement would not follow in all cases.

Q. 1476. In what cases will it not follow?

A. It will not follow an opening movement of the valve of the main needle nozzle.

Q. 1477. Would it not follow if the main needle were set half way open and the auxiliary needle set half way open under the fixed relation between them so established in the manner specified in the last question?

A. The manner last specified does not make a fixed relation between these parts.

Q. 1478. Would it not if the screws were turned down clear home as specified?

A. It would not.

Q. 1479. Why?

A. For the simple reason that there are other valves which would permit the passage of oil from one side to the other on certain movements.

Q. 1480. Aside from the other valves, and assuming that those other valves were not operated and did not permit any flow, such fixed relation would be established between the main needle and auxiliary needle, would it

not, and the possibility of interrelating these needles as just specified would exist, would it not?

A. There might be imagined such a combination by which that would result, but I would expect the man who desired such a result to adopt a more direct and simple means for obtaining it.

Q. 1481. In any hydro-electric power plant, what would you consider the normal position of the water-gate to be?

A. What do you mean by "normal" in this case?

Q. 1482. What would you consider the most customary position of the water-gate during the operation of the wheel?

A. There is no customary position of the water-gates. The position would necessarily depend on the amount of load on the wheel.

Q. 1483. Then that customary position would then vary in accordance with the load on the wheel, would it not?

A. It would not be a customary position, nor do I think that the word "normal" applies in this case. Naturally the position of that means adapted to control the amount of water admitted to a wheel would vary in accordance with the demand for said water. It certainly does not apply in the sense in which it is used in the Lyndon patent.

Mr. Blakeslee: We ask that the last sentence be stricken out as not responsive. Nothing has been asked about the Lyndon patent, specifically.

Q. 1484. Do you consider that the water-gate in any such hydro electric power plant has a normal position?

A. That will depend altogether upon the conception of the use of the word "normal."

Q. 1485. It will depend upon the load, somewhat, and upon the governing action, would it not?

A. If you refer to the word "normal", I see no connection. You would naturally expect the position of the controlling gates to depend upon the amount of water demanded.

Q. 1486. Then you would not care to define what in any given hydro-electric power plant is to be considered the normal position of the water-gate?

Mr. Westall: I will ask counsel to specify what he means by "water-gate." Does he mean the main nozzle supplying water directly to the wheel, or does he mean some gate back of that?

Mr. Blakeslee: Let the present line of questioning be understood as meaning the gates supplying water directly to the wheel, and as including the terms "water-wheel nozzle" and "water-wheel valve" and like terms, which we have used describing the controlling gate by which the final passage of water to the wheel is regulated.

A. Referring only to what we have been calling the water-wheel gate, and meaning such gates as control the flow of water to the wheel to drive it, I cannot see any application of the word "normal" to such gate as indicating a position more generally attained than any other position.

Q. 1487. By Mr. Blakeslee: Then any position in which you found the water-wheel gate might be considered as a normal position if you wished to select that position for such designation. Is that not correct?

A. We could not call it a normal position. As I understand it, this word does not apply in any sense to this particular case.

Q. 1488. Then the designation "normal position" is a relative term, is it not, and relates to one certain position, or a dozen certain positions, among a number of positions of the gate. Is that not correct?

Mr. Westall: Objected to as having been fully answered by the witness. The witness has clearly stated several times that the word "normal" has no proper application to the water-wheel gate.

A. As I have stated in connection with the use of other words, I would consider and define this word "normal" in accordance with the intent of the user thereof.

Q. 1489. By Mr. Blakeslee: You have undertaken to compare the disclosure of Claim 7 of the Lyndon patent in suit with certain other structures. In so doing what was your comprehension of the language "a combination of means to operate the water-gate in either direction from normal position."

A. I did not consider the use of the word "normal" in this case as the other words clearly indicated the intent of the claim.

Q. 1490. Then you ignored this language in your attempted comparison, did you?

A. I ignored that particular word.

Q. 1491. You were quite certain in such comparison, were you, as to what was meant by the language in the same claim, "and adapted to operate the by-pass valve from normal position in either direction"?

A. The specification clearly defines this at page 4,

line 35: "Normally the gate or valve in the by-pass will be half-way open." This is sufficiently distinct to convey the meaning intended in Claim 7.

Q. 1492. In connection with the by-pass valve, that word "normal" relates to the position for taking care of both inertia effects in the pipe-line. Is that not correct?

A. In the Lyndon patent the word "normal" has been specified to mean a half-open position which was required to take care of the inertia effects both on opening and closing action of the water-wheel gates.

Q. 1493. That same claim states ^{as} follows: "of means connected to the water-gate-~~opening~~^{rot} means and adapted to operate the by-pass valve from normal position in either direction, so as to control such valve inversely to the control of the water-gate, during governing action of the water-gate." As the operation of the by-pass valve is set up here with relation to the water-gate, inverse operation as between the two being specified, a governing action being specified as a period under consideration, are you prepared to state that the "normal" position of the water-gate is not related to the period of governing action?

A. The question is extremely indefinite, but answering it as I understand it, I will say that there is no connection to any normal position of the water-gate, inasmuch as this reverse action on the part of the by-pass valve is intended to start from any position of the main water-wheel gate.

Mr. Blakeslee: That is all.

May 20, 1914, A. M.

O. H. ENSIGN, produced as a witness on behalf of defendant, and being first duly sworn, deposed as follows:

DIRECT EXAMINATION.

By Mr. Westall:

Q. 1. State your name, age, residence and occupation.

A. Oliver Hiram Ensign; 903 Oakland avenue, Pasadena; occupation, electrical and mechanical engineer.

Q. 2. What training and experience have you had, if any, in mechanical and electrical fields, especially with reference to water wheels and water-wheel governors?

A. My training was in the class of 1884, course of mechanic arts, Cornell University. After that I followed up machine shop practice in Ithaca, New York, New York City and vicinity, as foreman of electric wiring, isolated plants in charge of construction work in

*-conduct
a locomotive
works in
Chicago*

Page 1478
31 Mr. Westall: I have a couple of witnesses, notice of whom will be given later, but I will give notice now that I will recall the witness Kvapishewski.

... same shop of the
Company, came to California in March,
1893, constructed the Los Angeles & Pasadena Railway and became superintendent of the Redlands Electric Light & Power Company, designing their plant which was later absorbed by the Edison Company and latterly built all the plants of the Edison Company up to the time of the Kern River plant, and since that time have

line 35: "Normally the gate or valve in the by-pass will be half-way open." This is sufficiently distinct to convey the meaning intended in Claim 7.

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much as this reverse action on the part of the by-pass valve is intended to start from any position of the main water-wheel gate.

Mr. Blakeslee: That is all.

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A. Oliver Hiram Ensign; 903 Oakland avenue, Pasadena; occupation, electrical and mechanical engineer.

Q. 2. What training and experience have you had, if any, in mechanical and electrical fields, especially with reference to water wheels and water-wheel governors?

A. My training was in the class of 1884, course of mechanic arts, Cornell University. After that I followed up machine shop practice in Ithaca, New York, New York City and vicinity, as foreman of electric wiring, isolated plants in charge of construction work in isolated electric lighting plants in New York City under the Edison United Company, in charge of the testing department of the General Electric Company one year in Schenectady, New York, chief inspector and assistant superintendent for about two years for the same shop of the General Electric Company, came to California in March, 1893, constructed the Los Angeles & Pasadena Railway and became superintendent of the Redlands Electric Light & Power Company, designing their plant which was later absorbed by the Edison Company and latterly built all the plants of the Edison Company up to the time of the Kern River plant, and since that time have

-conducted
a locomotive
works in
Schenectady
N.Y.

been with the United States Reclamation Service in charge of all their power plants and pumping work. I have constructed or been consulting engineer on twenty-five hydraulic power plants.

Q. 3. With what installations of hydraulic power plants have you been connected? You can state in a general way the most important plants.

A. Redlands, Mill Creek No. 1; Redlands, Mill Creek No. 2 and 3; Santa Ana, No. 1 and 2; Lytle Creek Power plant of the Edison Company; consulting engineer on the Santa Ana Light & Power Company's plant; with the United States Reclamation Service on the Roosevelt plant, the Arizona Falls, South Consolidated and Cross Cut plants of the Salt River project, the Strawberry power plant of the Strawberry Valley Power Plant, the Minidoka power plant, the Boise power plant, the Los Angeles Aqueduct Power Bureau, the—I counted them up the other night. I think there were about twenty-five.

Q. 4. In any of the plants with which you have been connected please state whether or not there was employed an automatic governing device to maintain constant speed of rotation of the wheels for varying load fluctuations. If so, please describe such governing devices.

Mr. Blakeslee: Objected to as calling for a conclusion.

A. All of these plants had some such device. The Mill Creek No. 1 plant, however, did not have a successful governing device until after the starting of the Santa Ana No. 1 plant which, I believe, was the first plant with which I was connected which had a device which did actually govern the plant and maintain constant speed in

the generally accepted understanding of modern practice. There were a good many different devices used, for all those plants. They are not all the same, but there are several of them.

Q. 5. Will you please give the date of the two last mentioned plants to which you have referred? That is to say, the date of the installations?

A. The Mill Creek No. 1 and the Santa Ana No. 1?

Q. 6. Yes.

A. Mill Creek No. 1 plant was started in the summer of 1893. The Santa Ana power No. 1 plant was put in service first assisting the Redlands Electric Light & Power load in December, 1898.

Q. 7. Did you ever visit the works of the Lombard Governor Company? If so, when and where and under what circumstances?

Mr. Blakeslee: Objected to as leading and indefinite.

A. The latter part of June or first of July, 1897, I visited their works and offices in Boston. I had gone east to investigate, among other things, the types of governors in existence for application to the power plant of the Southern California Power Company, Santa Ana No. 1, and visited the works of the Lombard Company to make arrangements with them for furnishing governors for that plant.

Q. 8. By Mr. Westall: Please state whether governors were installed in that plant and state the general circumstances leading up to the installation of the governors that were there.

A. In my eastern visit my attention was called to a governor working at the plant furnishing power for

the Niagara Gorge road, giving remarkable results. I visited that plant and spent a day there and saw the Lombard governor operating in this plant. I then visited the New York offices of the Pelton Water Wheel Company and expressed my satisfaction with that governor, and then went to Boston and with the Lombard Company's assistance arranged for the general features ~~for~~ that would enter into the governor that was to be furnished for the Santa Ana No. 1 plant. The Pelton Water Wheel Company finally made the provisions for the attaching of that governor.

Q. 9. When did you see this governor that you have spoken of as being at Niagara?

A. I can't say. It was around about the 1st of July. Whether it was the last of June or not or first week week in July I can't say, but it was around in that vicinity—of 1897.

Q. 10. Please state if you know whether the governors being then made by the Lombard Governor Company were provided with devices to prevent the governor overrunning. If so, please describe such devices.

Mr. Blakeslee: Objected to as leading and as calling for a conclusion and not the proper method of proof. The witness would best testify what the construction and mode of operation in such purported governor was without being told how to describe it by counsel.

A. They were provided with devices to prevent the governor overrunning, and such devices consisted of means for varying the length of the stem of the piston-valve controlling the flow of fluid under pressure to the two sides of the hydraulic ram, such stem-controlling-

length means was conducted through the medium of a dashpot to the element of the governor directly connected to the gate-operating mechanism of the turbine or deflecting nozzle, whichever was used. There was also independent of the dashpot a directly connected means moving in step with the gate-controlling means. The dashpot was so connected that for sudden changes and gate action of the non overrunning device it came back to normal through the action of the dashpot. The operation of the device operated to anticipate the application of water or the shutting off of the same to the turbine or impulse wheel before the normal speed was reached, to take into account the kinetic energy of both the moving water and the fly-wheel effect of the apparatus connected to the turbine or both.

Mr. Blakeslee: We further object to this testimony as not being the best evidence and not the proper method of proof of the matters questioned about.

Q. 11. By Mr. Westall: What have you to say as to the success or failure of the governor in use at the Niagara shop with the returning device connected to that governor which you have just described?

Mr. Blakeslee: This question is objected to as calling for a conclusion, and on the further ground of objection last registered, and, furthermore, the objection is made and is now made, and not previously, as the trend of this testimony and examination becomes apparent, namely, that it concerns or may obviously concern matters which are not within the pleadings in this case and not a part of the defense interposed by the defendant in his answer and that notice of any such purported defense or at-

tempted defense was not given complainant in the answer, and this objection will be understood as repeated without specific repetition to all questions put to this or any other witness concerning this subject matter.

A. It was a remarkably successful installation, giving to me the first demonstration of a truly governed water wheel in a practical commercial sense.

Q. 12. By Mr. Westall: You have mentioned an installation at the Santa Ana River No. 1 plant. Please describe what, if anything, you had to do with determining the design of the governor used at said plant.

A. The Lombard people had not attached one of their governors to an impulse wheel previous to that plant, and not being familiar with the action of the deflecting nozzle I outlined to them the general arrangement or combination with their governor head which contained a non-overrunning mechanism in connection with the hydraulic ram and connection to the rocker-shaft of the water-wheel which controlled the deflection of the nozzle. The water-wheel and all the other parts except the governor were furnished by the Pelton Water Wheel Company and correspondence and interviews were had with their engineers so that they could provide the necessary connection for the governor. The details of the design, however, were made by the Lombard people. I simply suggested the arrangement of parts so as to fit our installation.

Q. 13. Are you acquainted with the complainant in this case, George J. Henry, Jr., and, if so, how long have you known him?

A. I am acquainted with Mr. Henry and I met him

first on the above mentioned eastern trip sometime in July in New York City.

Q. 14. Of what year?

A. 1897—at the office of the Pelton Water Wheel Company.

Q. 15. State whether or not Mr. Henry had any thing to do with the installation of the Santa Ana River No. 1 plant, and, if so, what connection did he have with such installation?

A. The contract of the Southern California Power Company was with the Pelton Water-Wheel Company of San Francisco and New York. The apparatus was built at some eastern shop, somewhere in Delaware. I have forgotten the shop now. I discussed with Mr. Henry and Mr. Kunze in the New York office the detail of this apparatus with the impression, when doing so, that they were responsible for the manufacture and O. K.'ing. of the designs of that plant. Afterwards Mr. Henry's name appeared on the blueprints.

Q. 16. Who was the Mr. Kunze you have mentioned?

A. He was in charge of the New York office of the Pelton Water Wheel Company. I do not know his official position.

Q. 17. Did you make any drawing or sketch to show the Lombard Governor Company what special arrangements should be incorporated in the design to meet your requirements at the Santa Ana River No. 1 plant?

A. I know while with them and discussing the subject I sketched out the arrangement of the machine showing the location of rocker-shaft, wheel-shaft, bed-plate and

floor, merely for the purpose of showing how to attach the governor.

Q. 18. I now show you Defendant's Exhibit Lombard Patent No. 533656, and ask you to state if you have examined and if you understand the construction therein illustrated and described?

Mr. Blakeslee: The objection heretofore registered with respect to the testimony concerning matters not coming within the pleadings is repeated with reference to this purported Lombard patent.

A. I have.

Q. 19. By Mr. Westall: Please compare the device shown and described in Defendant's Exhibit Lombard Patent No. 533656 with that to which you have referred as having been submitted to you by the Lombard Governor Company of Boston, and installed at the Santa Ana River No. 1 plant.

Mr. Blakeslee: Objected to as not the proper method of proof, there being no basis of comparison on the record, the witness not having testified as to the construction of the purported Lombard device testified about, and assuming that any comparison exists. To that extent it is leading and suggestive.

A. This device shown in patent No. 533656 had all the essential features of the device installed at Niagara and Santa Ana No. 1, namely, a dashpot mechanically connected with a gate-moving mechanism to change the length of stem of the piston-valve controlling the flow to a hydraulic cylinder by rotating that stem through the medium of the rack, the stem being supplied with a screw thread.

Q. 20. By Mr. Westall: Compare specifically the returning device in use in Santa Ana No. 1 plant and that shown in the exhibit to which you have just referred.

Mr. Blakeslee: The same objection.

A. Do I understand that you want to show the differences?

Q. 21. By Mr. Westall: I want a comparison to show the similarity.

A. In Santa Ana No. 1 plant the dashpot was connected through a connecting rod with a lever, one end of which was connected to the piston rod of the hydraulic ram. The other end was attached to a suitable fulcrum so as to give a movement of the dashpot which was a fraction of the total movement of the piston rod. In this device the dashpot is operated through a bell-crank having a member consisting of a roller riding on an inclined plane or track moving simultaneously with the piston rod, and the rise and fall of the roller moves the dashpot. The Santa Ana governor also had an independent positive non-overrunning device connected, forming a very small leverage without the dashpot.

Mr. Blakeslee: We ask that the last sentence of the answer be stricken out as not responsive to the question and also upon the further ground that if considered it is not the best evidence.

Q. 22. By Mr. Westall: What pressure fluid was used to operate these governors at Niagara and Santa Ana River No. 1 plant?

A. At Niagara oil was used and at Santa Ana No. 1 water.

Q. 23. What was the source of supply used at the Santa Ana River No. 1 plant?

A. It was taken from the main penstock and reduced in pressure through the medium of a settling basin and suitable valves.

Q. 24. State whether or not the governor described as having been installed at the Santa Ana River No. 1 plant operated successfully, and whether the returning device of said governor efficiently performed its functions and met with all the requirements as a successful returning device.

Mr. Blakeslee: Objected to as leading and calling for a conclusion and not the proper method of proof. Let the witness state how it operated and that will speak better in the premises than an answer given to a question which defines what the answer is to be.

A. The governors operated satisfactorily and are still operating satisfactorily. It was better than anything I had seen up to that time.

Mr. Blakeslee: In view of the last answer of the witness I ask that the previous testimony of the witness in respect to this purported Santa Ana governing installation be stricken out and withheld from consideration as not being the best evidence and not the proper method of proof.

Q. 25. By Mr. Westall: When did you last see the governor to which you have referred as having been installed at the Santa Ana River No. 1 plant in successful operation?

Mr. Blakeslee: Objected to as leading and calling for a conclusion.

A. The 16th day of August, 1913.

Q. 26. By Mr. Westall: Between what dates did the

governor referred to in your last answer successfully operate, to your knowledge?

Mr. Blakeslee: The same objection, particularly that it calls for a conclusion as to the nature of the operation.

A. From December, 1898, to the date above mentioned and, so far as I know, down to the present time.

Q. 27. By Mr. Westall: In this suit infringement is charged of patent No. 695220 granted to Lamar Lyndon March 11, 1902, on an application filed September 13, 1900. I now call your attention to that part of the answer of complainant George J. Henry, Jr. to question No. 307 (record page 243), beginning at line 5 on page 241, to and including line 28, page 244, and ask you to state whether the testimony referred to correctly describes the condition of the water wheel governing art with reference to the matter therein testified to at the time of the Lyndon application, namely, September 13, 1900, and whether it is a true statement of the contribution to the art by Mr. Lyndon. Please state fully your reasons for any opinion you may express.

Mr. Blakeslee: Objected to in the first place on the ground that the witness has not testified that he is acquainted with the Lyndon patent and it will therefore be manifest, without the record showing such acquaintance, he could not very well testify accurately as to what Mr. Lyndon did or what his patent purports to establish as having been done by him, although, of course, the witness may be conversant with the state of the art. The objection is made with respect to the relation between the state of the art and the contribution made by Mr. Lyndon, evidenced by the patent in suit, and, further,

on the ground that it calls for a conclusion on the part of the witness.

A. I have read this testimony of Mr. Henry which says that Mr. Lyndon's invention prevented the governor from overrunning and infers that that was new. The governors I have mentioned above did not overrun, and that was early as 1897 in my observation at Niagara and in the installation in Santa Ana No. 1 in 1898 in December.

Mr. Westall: You may cross-examine.

CROSS-EXAMINATION

Mr. Blakeslee: I will now proceed to cross-examine the witness without waiving any of the objections heretofore noted, and particularly the objections as to the matters discussed by him and covered by question put to him on the grounds that they do not come within the pleadings in the case, notice thereof not being given to complainant in the answer, and await the decision of the court on these objections.

Q. 28. Did any of the 1897 and 1898 installations you have testified about, such as the Niagara and the Santa Ana installations, with respect to governing devices which you have discussed, produce any results different in nature from that which you understand would be produced in the operation of a speed regulator disclosed in United States Lombard patent, being Defendant's Exhibit Lombard Patent No. 533656?

A. As I understand this patent, they would not be different in nature but would be different in degree.

Q. 29. And the rate of any restraining action taking

place in any such governors was a constant rate, was it not?

A. No sir.

Q. 30. In what respect was it not constant?

A. If the change of speed or drop in speed or increase of speed of the water-wheels took place suddenly, the governing action was quicker than if it took place slowly. In fact, it could take place extremely slow and the governor would fall and make the change even slower still.

Q. 31. But that rate, referring to the mode of operation of the device disclosed in this Exhibit Lombard Patent, was a rate proportioned to the extent of motion of the part of the inclined surface causing the rocking action of the bell-crank, 37, was it not?

A. The movement of the non-overrunning device would not depend solely upon the degree of motion of the bell-crank. It would depend upon the relative speed of the piston rod and the adjustment of the dashpot as well as the degree of motion of the bell-crank, and the exhibit does not define the angle of the inclined plane.

Q. 32. The action of the dashpot, however, was caused through oscillation of this bell-crank, 37, was it not?

A. Yes sir.

Q. 33. And the extent of any such oscillation in any governing action was determined by the amount of inclined surface traversed by the roller carried by the bell-crank lever. Is that not correct?

A. Yes.

Q. 34. And that inclination of the part 36 moved by piston 3 was an unvarying inclination, was it not, and it is not, in this patent?

A. Yes sir; it is.

Q. 35. Then the amount of oscillation of the bell-crank in governing action is dependent upon the amount of motion in the piston 3 in its cylinder, is not that correct?

A. Yes sir.

Q. 36. And for every degree of oscillation of the bell-crank 37 a definite amount of traverse of the inclined surface part 36 by the roller of the bell-crank took place and takes place in this patent. Is that not correct?

A. Yes. As the extreme maximum.

Q. 37. Therefore there is a direct unvarying ratio, is there not, in the action of this device between the extent of movement of the part 36 and the degree of oscillation of the bell-crank 37. Is that not correct?

A. So far as the oscillation of bell-crank 37 is concerned, it would be in proportion to the degree of movement on the part 36. But the lengths of the two arms of the bell-crank are not defined, so that the amplitude cannot be expressed and the dashpot could be so adjusted that this could move slowly and not move the overrunning mechanism at all. And yet when this piston rod 10 moved quickly, the non-overrunning element would move, but not necessarily move when it moved slow.

Q. 38. And would that occur without any inclination of the upper surface of part 36?

A. No.

Q. 39. And that inclination in the Lombard patent is shown as a uniform unvarying inclination, is it not?

A. Yes sir; apparently.

Q. 40. And no means is disclosed in that patent for varying the angularity between the arms or members of

the bell-crank or relatively adjusting the same, is there?

A. There appears to be no means for relatively adjusting them in a completed manufactured device.

Q. 41. No such means is disclosed in this Lombard patent, is there?

A. ~~No~~, I understand that to refer to my former statement?

Q. 42. Yes. No such means for relatively adjusting this is shown in the patent?

A. No; and neither are there any dimensions to show what those relations are.

Q. 43. But the patent discloses the bell-crank as an integral and inflexible structure, does it not?

A. Apparently.

Q. 44. In the 1897 and 1898 devices you have discussed was there also a fixed ratio as between the dashpot-operating means and the part with which the same coacted, and I mean the same ratio between movements of both of these features?

A. The dashpot had a fixed movement relative to the piston rod actuated by the hydraulic pressure; but the part moved by and through the medium of the dashpot acting as a cushion did not necessarily move with a fixed ratio with reference to the movement of the hydraulic piston. It moved in accordance with the adjustment of the leak past the piston in the dashpot, the tension of springs of the non-overrunning element, and the speed of the movement of the hydraulic piston with the ram.

Q. 45. And that leak passed the piston of the dashpot or, as I take it, the rate of flow of the confined fluid in the dashpot, was a rate of flow or leakage established

in determining the action of the dashpot and was a constant rate when such adjustment had been made. Is that correct?

A. It was not.

Q. 46. In what respect was it not a constant rate after a given adjustment?

A. If I remember correctly, and I am ^{as} certain as I can be, that leak was controlled by a spring holding the valve in position. The whole mechanism was susceptible to changing action due to changing speed of the hydraulic piston forming the ram moving the casing.

Q. 47. Then there was a fixed ratio between the movement of the piston in the hydraulic cylinder and the movement of the dashpot body in these installations. That is correct, is it not?

A. Yes; ~~it~~ ^{that} is correct.

Q. 48. And as to the rate of flow of the liquid in the dashpot there was no mechanical device for positively varying this rate of flow in exact proportion to the speed of movement of the piston in the hydraulic cylinder?

A. There were two small hand controlled valves at opposite sides of the piston on the dashpot discharging into the oil supply chamber on top.

Q. 49. And those were operated purely manually and not automatically in the governing action?

A. They were used to adjust the violence or moderate the same of the dashpot action.

Q. 50. In other words, they were master valves which controlled the rate of circulation of the fluid in the dashpot and around the piston?

A. Up to the point where the spring valve in the piston which I mentioned took action.

Q. 51. And the spring valve you refer to was not controlled positively by mechanical connections?

A. No. I always understood that that was there more as a matter of safety.

Q. 52. In other words, as a vent to take care of over-stresses in the dashpot action. Is that not correct?

A. Probably so, although it no doubt acted under violent governing.

Q. 53. And under violent governing it might act or might not act, depending on the violence of the governing action. Is that not correct?

A. I believe that is true.

Q. 54. And you cannot say responsive to what violence of governing action this spring-controlled valve would work?

A. No sir.

Q. 55. And it might be quite possible, might it not, that only under the most extreme conditions of variation of speed of the water-wheel that this spring-controlled valve would move at all?

A. I could not say that.

Q. 56. You are not prepared to say that it would move under any of the usual governing conditions, are you?

A. I certainly would not say that it would not move, and I would not say either way—your question involves that it might not move at all, and I don't mean to say that. I think it might move under some governing conditions, but at the present time that is so far removed from me as to that detail of the tension of the spring that I cannot remember.

Q. 57. And you are not therefore prepared to state definitely that under an ordinary governing condition this spring-controlled valve would work at all, and by ordinary conditions I mean those usually met with in hydro-electric power generation?

A. Your question implies that I admit that it would do so, and I cannot say what I admit it would do. I believe it might act and I believe under some conditions it would act and under some conditions it would not. I could not swear what that thing inside there would do.

Q. 58. Was the action of this spring-pressed valve due to some action of the governor?

A. No. But I do remember now that I have shut both valves tight without injury, showing that the valve could not have acted without the spring-valve acting to a certain extent.

Q. 59. Could not the dashpot have acted as a rigid unit without any flow of liquid from one side to the other of the piston?

A. I believe it could have done so with the other valves open.

Q. 60. Could it not have done so with the other valves closed?

A. That I cannot state. I think the spring-valve only acted in one direction.

Q. 61. In other words, it only acted on piston play in the dashpot in one direction?

A. No; I think it would have to move through the outside valves. I believe it would lock it, although I do not remember that in detail.

Q. 62. What would lock it?

A. If there was no other vent the piston would be too tight, although that is a detail that I cannot now remember.

Q. 63. But if the spring-pressed valve did not work in either direction the piston and dash pot could move as a unit without relative motion?

A. I believe it could be adjusted as a unit in one direction. I don't believe they could be in both directions. I don't remember in detail.

Q. 64. But the spring-pressed valve could ~~only~~ act to change the flow of liquid in the dashpot in movement of the piston of the dashpot in one direction? Is that not correct?

A. I think I have stated all I can state on that; that I cannot remember in detail, but that I believe that to be true. But I am not sure.

Q. 65. So far as you recollect, that is the case, is it not?

A. Yes; I think so.

Q. 66. And the dashpot itself always was moved at a rate proportionate to the rate of motion of the piston in the hydraulic cylinder?

A. I believe that is correct. The dashpot body would move at a rate proportionate to the piston in the cylinder, but the dashpot action was adjustable and, therefore, under the control of the operator.

Q. 67. In other words, manipulated with the hand governed valves you have testified about?

A. Yes; which were set and allowed to remain in a constant position.

Q. 68. Have you kept in touch with the Lombard governor since 1898?

A. Only in an indirect manner, as to the results obtained in governing. I have not operated myself any of them personally, nor installed them personally, but have been drawing specifications with requirements of results and getting them.

Q. 69. You have seen Lombard governors in operation since 1898, have you not?

A. Yes sir.

Q. 70. Were all such Lombard governors you have seen since that year of the same type of construction as disclosed in Defendant's Exhibit Lombard Patent No. 533656?

A. They would perform the same function, although in greater degree than that appears to show.

Q. 71. I show you Complainant's Exhibit W and ask you if you know what it is.

A. It is a part of a Lombard governor head and a non-over-running mechanism.

Q. 72. And it includes a dashpot and piston in its operation, does it not?

A. Yes sir.

Q. 73. Do you find in Exhibit W any feature present which was not present in the Lombard governors you have testified about, of 1897 or 1898?

A. I find this not the same as in those. This device is not. The device attached to the end of the oil chamber for operating a valve controlling the dashpot action was not on those governors.

Q. 74. Do you understand how that valve controls the dashpot action in Exhibit W?

A. I have understood more or less how it is supposed to do, but there are only some instances where it will operate with the same degree of satisfaction.

Q. 75. You have seen them operate?

A. I have seen them try to operate, but I have not seen much result.

Q. 76. You have seen them in plants during the last five years, have you not?

A. Yes sir.

Q. 77. Do you ^{this} understand what did effect the valve control in ~~the~~ Lombard device produced in the operation of the device?

A. I have not gone into this thing very much because pretty nearly in every case we had to take it off, because it bothered us more than anything else. I never happened to have a case where it was of any value.

Q. 78. For what reason did it bother you?

A. You will have to ask the boys in the power station. I am not adjusting governors any more myself. It is a good many years since I did that.

Q. 79. Then do you know of your own knowledge any reason why it was not satisfactory?

A. In every governor installation there are a number of elements—fly-wheel capacity, water ram and other features that enter into the action of the whole plant—and the plants in which it has been called to my attention that this was troublesome they probably did not have any need of this device. I can-

not remember much in detail about it except that the boys have reported it as not considered an improvement in the Lombard governor.

Q. 80. Still you know of its being used in a number of plants?

A. Yes; in use in a number of plants.

Q. 81. The use of that automatically controlled valve in Exhibit W produces a variable motion of the piston in the dashpot, variably affecting the movement of the balanced valve controlling introduction of power fluid to the hydraulic cylinder. Is that not correct?

A. Yes; but such variable movement is adjustable by the adjustment of this device.

Q. 82. That is, the degree of such variable movement is so adjustable?

A. Yes sir.

Q. 83. But this variable movement takes place whenever this automatic valve operating in the dashpot moves. Is that not correct?

A. That is true, unless this is entirely cut out of action by the adjustment.

Q. 84. In other words, whenever this valve is free to act automatically, and controls circulation or flow of fluid in the dashpot, this variable movement of the valve-controlling the introduction of power fluid to the hydraulic cylinder in the governing action takes place. Is that not correct?

A. It can also take place with this valve completely disconnected.

Q. 85. But with the valve adjusted out of use,

the same effects would not be produced in the action of the governor to prevent overrunning, would they?

A. Not the same in degree, but similar in quality.

Q. 86. And entirely different phasing of the action of the piston in the dashpot would occur, would it not, with this adjustable valve thrown out of commission?

A. That depends on how it is thrown out of commission. If it is thrown out of commission by removing its connection with the carriage carrying the movable rack, it can be adjusted to any phase. If it is thrown out of commission by merely opening the oil vent in one end of the cylinder, it would be free to act only in one, and it would not be quite so sensitive against overrunning.

Q. 87. But as a matter of fact, when this automatic valve is in commission and performs its office, a variable rate of action of the piston in the dashpot is produced. Is that not correct?

A. Yes.

Q. 88. Now, that variable rate could not be produced in kind with this automatic valve out of commission or not performing its office. Is that not correct?

A. I don't think so. I think it performs just as good governing without that with the form of governor that I described in use at Niagara Falls and Santa Ana No. 1, in which there was no valve controlling each end of the dashpot except by manual

adjustment and setting, as I have ever seen this perform.

Q. 89. My question was not one of comparison, but it was directed at determining whether the same variable rate of piston movement, that is, of movement of the piston in the dashpot, would occur with the same variable rate in kind with this automatic valve thrown out of commission?

A. It would depend entirely on the plant and all the other functions entering into the governing.

Q. 90. Under any circumstances of environment or operative features in the plant, could the same variable rate of movement of the piston in the dashpot be produced with this automatic valve thrown out of commission that is produced with the automatic valve working so as to perform its office? And I am comparing now only these two conditions.

A. No; I do not believe it could be.

Q. 91. In other words, there is a distinct difference, is there not, as to piston action occurring as between the use of the device disclosed in Defendant's Exhibit Lombard Patent No. 533656, and the use of Complainant's Exhibit W with the automatic dashpot valve performing its office?

A. Only in degree. The difference is only in degree.

Q. 92. But there is a difference, is there not, as between the piston action in one direction and the piston action in the other direction as to the variation in the rate of motion in the piston action?

A. For any definite rate of movement of the

dashpot there would, no doubt, be a variation in the movement of the dashpot piston with this device attached and adjusted in accordance with its intended use. I am now referring to the automatic valve of Exhibit W.

Q. 93. And that variation of the piston movement would not be automatically produced in the action of the device disclosed in Defendant's Exhibit Lombard Patent No. 533656, would it?

A. The device shown in the Lombard patent No. 533656 would give a variable movement to the dashpot piston in performing its function of preventing overrunning, and the amount of variableness in its action compared with Exhibit W and the device attached and shown on Exhibit W would only be in degree. They both give a variable movement.

Q. 94. But the automatic valve of Exhibit W introduces further, does it not, a variation of the rate of movement of the piston which is progressive, in proportion to the extent to which the automatic valve opens?

A. To a certain extent.

Q. 95. And the piston will move faster while the automatic valve is opening and will move slower while the automatic valve is closing. Is that not correct?

A. Are you speaking of the movement of the piston with reference to the dashpot?

Q. 96. Yes sir.

A. Do you refer now to the automatic valve attached to the dashpot on Exhibit W?

Q. 97. Yes sir.

A. I should think just the opposite would occur. Or, rather, with the automatic valve closed, the piston moves more nearly at the same speed as the dashpot. With it open, it moves with a slower speed than the dashpot.

Q. 98. By "faster" I mean the relative movement between the piston and the dashpot will increase as the automatic valve is opening, and will diminish while the automatic valve is closing. Is that not correct?

A. It will tend to diminish and will tend to increase. That is correct.

Q. 99. And that is productive of a variable returning movement of the valve which controls the admission of power fluid to the hydraulic cylinder actuating the water-wheel gates. Is that not correct?

A. Yes; that is correct.

Q. 100. And without this automatic valve on the dashpot as shown in Complainant's Exhibit W, and using merely hand controlled valves set at a predetermined point of adjustment, such variable return of the valve controlling the admission of fluid to the hydraulic cylinder will not occur, will it?

A. The particular variable return of this valve imposed by this automatic valve shown on Exhibit W may not occur, but a variable action of the return of the piston valve controlling the hydraulic cylinder will occur with the results that would only in degree differ from that produced by Exhibit W and, in some

cases, the former is better and in some cases Exhibit W is better.

Q. 101. Were this automatic valve not present or not in use in Complainant's Exhibit W, the returning action of the hydraulic cylinder controlling the valve would be merely an action responsive to increase or decrease of relative movement between the piston and the dashpot, in response to the actuation of the dashpot by drive from the piston of the hydraulic cylinder, with a direct ratio between such dashpot movement and hydraulic cylinder piston action, and subject to a pre-determined fluid circulation in the dashpot. Is that not correct?

A. It is not correct.

Q. 102. And for what reason is it not correct?

A. For the following reason: That there is not a constant flow through the manually-set or other valves around the dashpot piston from one side of the piston to the other into the oil recess, and so forth, because the variable speed of movement of the dashpot body creates a variable pressure to force fluid through these valves, and it will vary in degree with the speed of the movement of the dashpot whether it has the automatic valve shown on Exhibit W or without it, and simply manually controlled valves.

Q. 103. But that speed or rate of circulation in the dashpot is arbitrarily varied by automatic action of the automatic valve on the dashpot in Exhibit W resulting in the arbitrary variation of the returning rate of the piston which controls the flow of power fluid to the hydraulic cylinder. Is that not correct?

A. That is correct, and by so doing it takes out of the hands of the operator the full control of the action of the dashpot that he is able to obtain with the device mentioned as used in the Santa Ana No. 1 plant and at the Niagara plant.

Q. 104. In other words, substitutes an automatic feature which arbitrarily varies the returning action of the valve controlling the hydraulic cylinder. That is correct, is it not?

A. That is correct. And such arbitrary control oftentimes does not fit the plant and makes it impossible for the operator, with this connected in operation, to get a control and governing of the plant that he would get without it.

Q. 105. And that depends on the nature of the plant?

A. Yes sir.

Q. 106. And this arbitrary variation of the returning movement of the controlling valve arbitrarily affects its action to prevent overrunning, does it not?

A. Yes sir; it will.

Q. 107. And this automatic valve on the dashpot Exhibit W is in a governing installation set into operation or caused to act upon motion of the train of mechanism which operates the water-wheel gates in a hydro-electric plant?

A. No.

Q. 108. Is not this automatic valve on the dashpot of Exhibit W in a given hydro-electric installation set into movement by power applied to the dash-

pot device from a train of mechanism which governs the variation of the water-wheel gates?

A. Only through the action of the dashpot piston itself. The motion is transmitted through the dashpot piston.

Q. 109. But the prime mover is the governing mechanism which I have referred to?

A. If this were turned around.

Q. 110. But ultimately it comes from that train of mechanism?

A. It does not act until the dashpot piston itself has actually moved the dashpot body.

Q. 111. But the power comes from such train of mechanism for operating this adjustable valve. That is correct, is it not?

A. Yes; that is true.

Q. 112. I notice that in Defendant's Exhibit Lombard Patent referred to the connection for actuating the dashpot is between the dashpot itself and the part 36 actuated by piston 3, whereas in Complainant's Exhibit W the connection from the piston of the hydraulic cylinder to the dashpot device is through the piston rod. Will this make any difference in your previous testimony which you wish to correct in any respect, from the understanding that this reversal of parts is to be read into your previous testimony?

A. In all the previous testimony I have had in mind the relative movement of the dashpot and dashpot piston, regardless of which end is connected.

Q. 113. The Santa Ana plant that you referred

to had a deflecting nozzle for projecting the water on the wheel. Is that correct?

A. Yes sir.

Q. 114. Do you know of any other plants using a Lombard governor like that of the 1898 Santa Ana plant that you have testified about?

A. There are four in that plant. There are four in Mill Creek No 3, though it may be that those have this adjustable valve on Exhibit W on, and there are two in the Lytle Creek plant, and I think there are now four in Mill Creek No 1, all of the same general character. But I do not remember the details.

Q. 115. And you don't remember how many have or have not the adjustable valve of Complainant's Exhibit W on them?

A. No; I do not.

Q. 116. Have you ever inspected the power plants of Division Creek and Cottonwood plant at the Los Angeles aqueduct?

A. I have been at the power plant at Cottonwood.

Q. 117. Did you notice on that plant that the Lombard governor was in use having a feature the counterpart of Complainant's Exhibit W?

A. I do not remember the automatic valve.

Q. 118. When were you at those plants?

A. About four years ago.

Q. 119. They were in operation at the time?

A. They were.

Q. 120. And they were supplying current for use in the direction of the Los Angeles aqueduct—dredging, and so forth?

A. Yes sir.

Mr. Blakeslee: That is all.

May 21, 1914, P. M. J. A. LIGHTHIPE, produced as a witness on behalf of defendant, being first duly sworn, deposed as follows:

DIRECT EXAMINATION

By Mr. Westall:

Q. 1. State your name.

A. J. A. Lighthipe.

Q. 2. Where do you live?

A. 1701. Arlington street, Los Angeles, California.

Q. 3. What is your business or occupation?

A. Electrical engineer.

Q. 4. Please look at the exhibit I now show you and state in a general way if you can what it is.

Mr. Blakeslee: Objected to as leading and not the proper method of proof.

A. That represents the power plant of the power development company of Bakersfield in which the Girard water-wheels are directly coupled to a General Electric Company's three-phase generator.

Mr. Westall: Let the record show that the exhibit referred to and identified by the witness is Defendant's Exhibit Interior Power Development Company's powerhouse.

Q. 5. In the photographic exhibit to which you have just referred, namely, Defendant's Exhibit Interior Power Development Company's Powerhouse,

do you recognize any of the persons therein represented, and, if so, please state their names and, if you know, what if any connection they or any of them had with the installation of the Bakersfield plant which you have mentioned.

A. The gentlemen sitting on the base of the General Electric Company machine was a Mr. McMurdo, civil engineer employed by the Power Development Company at Bakersfield, at one time the county engineer, and the gentleman sitting on the water-wheel is Mr. Berry, at that time chief draftsman and designer of the Girard Water-Wheel Company of San Francisco. The man lying down on the floor was Mr. Smiley of the Lacy Manufacturing Company of Los Angeles. I am not sure who the man is at the switchboard.

Q. 6. When was the Bakersfield plant to which you have just referred installed, and how long thereafter, if at all, was it operated, to your knowledge?

Mr. Blakeslee: Objected to in so far as it calls for the conclusion of the witness with respect to the operation or suggested operation of this plant.

A. The plant was installed in the fall of 1896 and the spring of 1897 and, to the best of my knowledge and belief, the electrical end of the equipment is still in operation.

Q. 7. By Mr. Westall: Please state the names of any persons whom you know to have been connected with the designing, superintendence or installation of the plant of the Power Development Company to which you have just referred.

A. Mr. Edward Cobb was the mechanical engineer; Mr. Van Emon was the superintendent of the Girard Water-Wheel Company; Mr. Dearth was the resident superintendent employed by the Power Development Company.

Q. 8. Were any changes made in the wheels or governing mechanism of the Power Development Company plant about which you have been testifying, after its installation in 1896, and, if so, state what changes were made?

Mr. Blakeslee: Objected to as not a proper method of proof. Let the witness state what he knows about the plant. It is further objected to on the ground that it is leading.

A. There was no change made in the water-wheel beyond the adjustment of the various valves. Some of them were bound pretty fast.

Q. 9. By Mr. Westall: Was there any change made in the wheels?

A. No; not during this time.

Q. 10. I mean at any time after its installation.

A. After the test of the water-wheels the wheel was finally removed and a Tuthill wheel substituted, and after that a Knight wheel which I believe is still in operation.

Q. 11. Please state why these other wheels were substituted in place of those originally put in, if you know.

Mr. Blakeslee: Objected to on the ground that the witness is not qualified, not yet having testified what, if any, his connection with this alleged install-

ation was and, therefore, what his source of knowledge might be with respect to this plant.

Q. 12. By Mr. Westall: I will ask you first what connection you had, if any, with the installation of the plant referred to.

A. I was the local engineer of the General Electric Company of Schenectady, New York, and was in direct charge of the installation of the electrical machinery in this power plant.

Q. 13. In connection with your duties was it necessary for you to visit the plant referred to, and how often were you at the plant after its installation in 1896?

A. I made frequent trips to this plant during the construction period. I was there when we started the plant running. I was also there during the test of the efficiency of the plant.

change
Q. 14. Please state in a general way the circumstances which puts you in possession of the facts as to ~~each~~ of the water-wheels and also the reasons why those changes were made, if you know.

Mr. Blakeslee: Objected to on the ground that the witness has not qualified, not having testified to his presence at the plant after the original test, nor as to his having any connection whatsoever with those parts of the installation separate and distinct from the electrical features and not calling for the best evidence.

A. In attempting to load up the machine we found that after we had put a little over half a load on the machine the water-wheel slowed down. The

question then came up whether the lack of efficiency was in the Girard wheel or in the three-phase generator, and a series of tests to establish this point was made under the leadership of Mr. Edward Cobb, the mechanical engineer, I taking a prominent part in the test. It was finally decided that the efficiency of the water-wheel was very low, and it was finally replaced by a wheel of another make.

Q. 15. By Mr. Westall: Do you know when that change was made?

Mr. Blakeslee: The same objection.

A. I think it was made in the autumn of 1897.

Q. 16. By Mr. Westall: When you speak of efficiency of wheels do you refer in any way to the mechanism by which the speed of the wheel was regulated?

Mr. Blakeslee: Objected to as leading.

A. No; I refer to the amount of actual power generated by the water-wheels with a given amount of water.

Q. 17. By Mr. Westall: State whether or not any of the changes referred to were made on account of any inefficiency, if I may use the term, of the governor employed.

Mr. Blakeslee: Objected to as leading and not the proper method of proof. Let the witness fully in his own language and without suggestion state what the reasons were and what the causes were that contributed to the inefficiency testified about.

A. There were no changes made in the governor. The governor gave perfect satisfaction and govern-

ing remarkably well up to the capacity of the water-wheel.

Q. 18. By Mr. Westall: I now show you two bound volumes, being exhibits offered in evidence in this case, and ask you to state if you know what they are.

Mr. Blakeslee: Objected to on the grounds heretofore urged to these matters, not being within the pleadings in the case.

A. Volume 2, 3, and 4 and 5 of the Journal of Electricity published in San Francisco under the editorship of George P. Low.

Mr. Westall: Let the record show that the witness has referred to Defendant's Exhibit Journal of Electricity, Volume 2 and 3, and 4 and 5.

A. I received copies of these papers shortly after the date of publication and read them.

Q. 19. By Mr. Westall: Do you know in a general way the character of the publications to which you have just referred and the extent of circulation at the time to which you have referred, namely, '96 and '97?

Mr. Blakeslee: Objected to as not the proper method of proof or best evidence of its circulation.

A. It was a paper published in San Francisco and was universally read by those interested in electrical business of the coast. I do not know the circulation.

Q. 20. By Mr. Westall: I now call your attention to page 85 of the Journal of Electricity referred to, volume 4, No 5, under date of August, 1897, enti-

tled, "The Bakersfield Transmission", and ask you to state if you have ever seen that article and, in a general way, what the subject matter of the article is, identifying the various cuts that you see on the page mentioned and subsequent pages to and including page 91.

Mr. Blakeslee: Objected to as not the proper method of proof, and not the best evidence.

A. I read this article after it was published and it is one of George P. Low's typical descriptions of the new powerhouse and transmission systems as they were installed in California. The cuts illustrated are most of them familiar to me as showing parts of the plant in course of construction and completion, and diagram of connections.

Q. 21. By Mr. Westall: To which plant do you refer?

A. To the power plant situated in the mouth of Kern River Canyon in the vicinity of Bakersfield, and also the sub-station installed in the city of Bakersfield.

Q. 22. About which you have been testifying in your previous answer?

A. Yes sir.

Q. 23. Do you recognize the photograph on page 91 of the Journal of Electricity referred to?

A. I do.

Q. 24. Please state what that is.

A. That is a photograph of the interior of the powerhouse situated at the mouth of the Kern River

Canyon, and shows the generating sets coupled directly to the Girard wheel.

Q. 25. I now call your attention to an article in Defendant's Exhibit Journal of Electricity, Volumes 4 and 5, being in volume 4, No 6, at page 109, under date of September, 1897, said article being entitled, "Water Wheel Governing", and ask you if you have ever seen that article.

A. I have.

Q. 26. When did you first see it?

A. As soon as it was published.

Q. 27. At what time?

A. In September, 1897.

Mr. Blakeslee: Objected to as leading, and it will be noted that the date appears on the paper.

Q. 28. By Mr. Westall: Please state in a general way, if you know, what the cuts on page 110 of volume 4, No 6, of the Journal of Electricity represent.

A. They represent the fly-wheel governor of the Girard water-wheel as installed in the Bakersfield powerhouse to which I have heretofore referred.

Mr. Westall: You may cross-examine.

CROSS-EXAMINATION

Mr. Blakeslee: I will proceed to cross-examine the witness without waiving any of the objections of record and particularly those pertaining to the want of notice in the answer of purported defenses discussed with the present witness, such as the volumes of Journal of Electricity and alleged installations of

the Power Development Company near Bakersfield. The objections on these scores are to be settled by the court.

Q. 29. By Mr. Blakeslee: Have you ever at any time devised and placed on the market any water-wheel governing apparatus, Mr. Lighthipe?

Mr. Westall: Object to the question as not proper cross-examination. The witness has confined his testimony exclusively to the question of efficiency of the wheels and also to identifying the periodicals referred to.

Mr. Blakeslee: It is submitted that it is perfectly appropriate to question the witness as to his knowledge of the art, which is concerned in the matters inquired into on direct examination, and it is also proper to test his expertness, and his capability as a judge of the operativeness, efficiency and success of apparatus within the same kind of art.

Mr. Westall: It is to be noted that the witness did not qualify as an expert but merely as a fact witness, and notice is given that if this line of questioning is persisted in counsel will be making the witness his own.

Mr. Blakeslee: Counsel has taken up with the question of efficiency, and that involves the knowledge and ability to judge of the operativeness, and of all the factors entering into the determination of efficiency, and therefore, the door is opened to inquiry on cross-examination in this respect.

A. I devised a water-wheel governor about the year 1895 and '6 to operate a plant at Columbia, Cal-

ifornia,—the old type of governor that was installed not being sensitive enough to control the speed of the water-wheel—in a mining hoist load.

Q. 30. And how many such governors were installed by you, to your knowledge?

Mr. Westall: The same objections are repeated, and the witness is instructed that he need not answer this line of questioning as an expert witness unless he is paid the usual expert fees, unless he so desire.

A. There was only the two governors made, the first one being too small and was replaced by a larger one. No attempt was made to market this governor by me personally, and I assigned the patent over to the General Electric Company at Schenectady, in whose employ I was.

Q. 31. By Mr. Blakeslee: Did they do anything with its manufacture or exploitation, to your knowledge?

Mr. Westall: The same objection is repeated.

A. Not to my knowledge.

Q. 32. By Mr. Blakeslee: This governor was actually used, do I understand, in two installations or this same first installation?

A. The same first installation.

Q. 33. And how long was the use of the second governor in this installation continued?

Mr. Westall: Objected to as not proper cross-examination, and the witness is instructed that he need not answer.

Mr. Blakeslee: The court will notice that coun-

sel is continuing his tactics of instructing the witness, and will take into account the manifest effect upon the witness of such unwarranted and improper instruction.

A. The second governor was in operation until the entire plant had been changed, when a more modern plant was built.

Q. 34. How long a period of use was there of this second governor?

Mr. Westall: The same objection.

A. I should judge about two years.

Q. 35. By Mr. Blakeslee: And that was a hydro electric plant?

A. Yes sir.

Q. 36. What was the full load capacity of that plant, approximately?

A. About 500 horse-power.

Mr. Westall: The same objections are repeated to all this line of questioning as not being proper cross-examination.

Q. 37. By Mr. Blakeslee: The second governor was used in this installation during all these two years?

A. I think so.

Q. 38. And it operated to control the supply of water through the penstock to the wheel, that is, to control the water-wheel gate or gates?

A. Yes sir.

Q. 39. That governor had both electrical and mechanical features, did it not?

Mr. Westall: The same objection is repeated to all these questions.

A. It contained a small motor that revolved a worm which acted directly on the levers attached to the gate. This motor was put in operation either in a forward or reverse direction by means of contacts attached to the ordinary ball governor.

Q. 40. By Mr. Blakeslee: The water-wheel gates were operated through the hydraulic cylinder, were they not?

Mr. Westall: The same objection.

A. My recollection is that I had direct contact of the lever in the gate itself, having a motor of approximately one-half horsepower for the leverage of the screw. I had abundant power to move it. I did not need the auxiliary effect of a water piston.

Q. 41 By Mr. Blakeslee: It was a direct connected motor operating the gate ?

A. Yes sir.

Q. 42. And this governor had electrical contacts, did it not?

Mr. Westall: These questions are objected to and it is moved that all the testimony in regard to the governor referred to be stricken out as a manifest attempt on the part of the complainant to prove his prima facie case during the time allowed to the defendant, and it is not proper cross-examination.

Mr. Blakeslee: It is to be noted that the defense has dealt largely with the disclosures of the Lyndon patent in suit, and this examination of the witness, for the reasons above set forth, as rendering the

examination in cross proper, and is clearly concerned in the treatment of the defenses presented in this case.

Q. 43. Where was the current obtained for this motor?

A. From the exciter that supplied the exciting current to the three-phase generator.

Mr. Westall: It is to be understood that the objections heretofore noted are repeated to all this line of questioning referring to the governor mentioned, without being specifically repeated after every question.

Q. 44. By Mr. Blakeslee: I refer you now to volume 4 of the Journal of Electricity, No 6, being one of the publications which you have examined in your direct examination, and, particularly, to page 109 thereof, and I will ask you if you recognize the cut displayed.

A. I do. This is the photograph of the second governor built.

Q. 45. The one which you have been discussing in the last few previous questions? Is that correct?

A. Yes sir.

Q. 46. Can you state briefly what some of the mechanical features shown in this cut are?

Mr. Westall: The same objection.

A. The matter shown on the left of the ball governor fastened to the top of the motor. The screw drive that is directly connected with the armature of the motor is shown on the right. That screw drive is extended. The contact is operated by the

ball governor and is shown just below the brake that was attached to the shaft of the armature to stop the momentum of the armature as soon as the contact is broken. This, in turn, worked a relay of carbon contacts that operated the motor, this being made so as to minimize the amount of current at the point of contact as operated by the ball current.

Q. 47. By Mr. Blakeslee: Just shunted in?

A. Yes; to one side and then the other.

Q. 48. When were you last at the Power Development Company's plant on the Kern River?

A. I have not been at the powerhouse since 1898, I think, or 1897. I am not sure which.

Q. 49. Are you sure that you were there after the time when you say the Girard wheels were removed—when you say the Girard wheels were removed from the plant?

A. I was not there after the Girard wheel was removed from the plant.

Q. 50. And that was as near as you can remember in the autumn of 1897?

A. Yes sir.

Q. 51. You could not place the month?

A. I could not place the month. It was that winter sometime. I could not place the month within several months.

Q. 52. The nearest you can recollect is that it was the autumn of 1897?

A. Yes; the autumn or winter of that year.

Q. 53. Then you never saw the attempted operation of that plant by the use of the Tuthill or

Knight wheels or any other wheels or any other apparatus in substitution for such wheels, or any other apparatus in substitution for such wheels, or in conjunction therewith. Is that correct?

A. It is.

Q. 54. Were you present when the Girard wheels were removed from that plant?

A. I was not.

Q. 55. Then you don't know of your own observation or knowledge just what was taken out of that plant when these Girard wheels were removed?

A. I do not.

Q. 56. How long were you at the Power Development Company plant in total time, altogether?

A. I should say six weeks. I simply made trips down there for a day or two days and came back.

Q. 57. And you think these scattered days would total up to six weeks?

A. About six weeks.

Q. 58. That is, the days that you were actually at the plant?

A. Yes sir.

Q. 59. And that was during a period of—

A. Six or eight months.

Q. 60. Commencing, we will say, with the first part of 1897?

A. Yes sir.

Q. 61. Do you say you were there when the test of the Girard wheels was made by Mr. Cobb?

A. I was.

Q. 62. Was it your conclusion that the Girard wheels were themselves inefficient?

A. It was.

Q. 63. What would you consider would have been a satisfactory efficiency of those Girard wheels at full load—say 750 horsepower?

A. 80 per cent.

Q. 64. You would have considered that a thoroughly satisfactory efficiency?

A. I would at that time.

Q. 65. And you believe the Girard wheels were removed because of the lack of proper efficiency of those Girard wheels?

A. Yes sir

Q. 66. The governing apparatus included, did it, a device having movable parts coupled responsively to the water-wheel shaft and generator shaft?

Mr. Westall: Objected to as not proper cross-examination and an attempt to have the witness testify as an expert on matters which have not been inquired of on direct examination.

Mr. Blakeslee: It is to be noted that the witness testified on direct examination that the governor at this plant utilized a device known as a dynamometer, and I am trying to find out from him what the construction of it was.

A. It did.

Q. 67. And it was therefore both a speed sensitive and load sensitive device?

A. Yes sir.

Q. 68. Did you ever see such a speed sensitive

and load sensitive device constructed in general conformity with the details of this so-called dynamometer of the Power Development Company plant installed in any other governing apparatus of a hydro-electric power plant?

A. I did not.

Q. 69. And that is, neither previous to nor subsequent to seeing this device in the Power Development Company plant?

A. I never have.

Q. 70. Have you known of other installations where such a device might have been employed?

A. I have never seen it used.

Q. 71. Do you know where it might have been employed in governing? That is, where conditions would have favored its use?

A. It could have been used.

Q. 72. You have spoken of certain valves sticking in this governor. What did you refer to in such statements?

A. The water was gritty and Van Emon had to ease up the motion of the valve, especially the by-pass valve which was sticking badly when first installed. It was too close a fit.

Q. 73. It was necessary to shut down the plant at the time while you were there to fix this so-called by-pass, was it not?

A. We hadn't had any power on our plant yet. We were just starting her up.

Q. 74. Was the attempt made to operate the

plant to supply power commercially while you were at the plant?

A. Oh yes; at Bakersfield.

Q. 75. During such time was it not necessary to shut down the plant more than one time to attend to this so-called by-pass device?

A. I think after we got through with the preliminary adjustment we had no further trouble.

Q. 76. Isn't it true that one or more of the levers and gate-connections constituting part of the installation, including the so-called by-pass, were thrown out of gear or broken during attempted operation of this plant while you were there?

A. I don't remember of anything breaking. Mr. Van Emon and Mr. Berry were both on the job for some time.

Q. 77. And they had more particular supervision of these features?

A. The water-wheel and governor.

Q. 78. In other words, your work pertained purely to the electrical side of the installation?

A. Yes sir.

Q. 79. And you rather felt it was up to Cobb to determine the features of efficiency of the wheels, did you not, you being more concerned in the yield of the generator side of the plant?

A. Yes.

Q. 80. And when this test was made you, I suppose, were desirous of the generator making as good a showing as possible?

A. I was.

Q. 81. And you did not determine during such test at any time any efficiency in the generators themselves or any troubles in the fields or field windings or armatures or any circuit troubles at all?

A. No troubles developed at all in the electrical apparatus.

Q. 82. How long would you say was the total period of attempted operation at this plant of the Girard wheels during the total time of six weeks when you say you were at that plant?

A. I was at the plant during the test, and after it started off with its limited amount of power, about sixteen days; and I left the plant working very satisfactorily within its capacity.

Q. 83. Then sixteen days would be an outside estimate of the period of commercial running of this installation, if you can call it such, within your knowledge?

A. That is the length of time I was at the powerhouse of the plant. I made several other trips down at the receiving end of the plant.

Q. 84. That is the length of such run, as far as you know it from your own observation obtained from attendance at that plant?

A. Yes.

Q. 85. You had nothing to do personally with this so-called by-pass device?

A. Nothing.

Q. 86. And did you have anything to do personally with the regulating or supervision of the so-

called dynamometer feature of the governing apparatus or any other features of this apparatus?

A. I had nothing to do with the water-wheel or its governor.

Q. 87. Then you were, as to all features of this plant, aside from the electrical generating device,—you were a mere interested observer?

A. I assisted Mr. Cobb in the test, as the method of measuring the power developed from the water-wheel was electrical, from our measuring instruments on the board.

Q. 88. Aside from such electrical work your interest was merely that of an observer, was it not?

A. Yes sir.

Q. 89. And you were not responsible in any way for anything in that plant except the generating features?

A. That was all.

Q. 90. That is, the wheel and governor?

A. That was all.

Q. 91. You say the water supply to the Girard wheels at this point was gritty. How would you compare such content of grit or other content, that there may have been in the water, with the water utilized in the average hydro-electric generating station?

A. It was about on a par with the average water. Every water power that runs over a bed of granite usually carries a small amount of matter in suspension.

Q. 92. And that is what you find most always, is

it not, in the water supply of such plants from streams and canyons in the California mountains?

A. Yes sir.

Q. 93. I suppose the usual means was employed to prevent floating objects, such as sticks, brush, twigs, and the like, from entering the penstock from the flume at that plant. Is that not so?

Mr. Westall: Objected to as not proper cross-examination.

A. There was a grizzly at the penstock to prevent any object of any size entering the pipe.

Q. 94. By Mr. Blakeslee: That was of a mesh or interstice size not larger than an inch in the clear?

A. Probably smaller than an inch.

Q. 95. And that was located where the flume joined the penstock?

A. Where the flume joined the penstock.

Q. 96. And the penstock or pipe-line, was there any other device on that provided as you remember in any way affecting or affected by the flow of water through the penstock?

Mr. Westall: Objected to as not proper cross-examination, and warning is given that counsel is making the witness his own.

Mr. Blakeslee: Counsel has certainly opened the door to questioning the witness as to anything concerned in the operation of this plant during the time when he testifies that he was present there. The general operation of the plant having been testified to have been under his operation, and he having stat-

ed that he was there in authority with respect to the installation and provision of a part of such plant, this examination is proper, and he having as he states participated in the test of such plant.

A. There was an air chamber attached to the main water pipe just outside of the building.

Q. 97. And that performed what office, so far as you know?

A. That was to take up undue inertia due to change of velocities of the water in the pipe.

Q. 98. And its action in so taking up inertia will be to set up oscillation in the pipe, will it not?

A. It naturally would.

Q. 99. In other words, there would be a rebound after the air bubble was acted upon by the water?

A. Yes sir; it would naturally rebound.

Q. 100. Are such air chambers used upon pipe-lines to any extent today in up-to-date installations for hydro-electric generator purposes?

Mr. Westall: Objected to. The witness has not qualified as a hydraulic engineer and has not testified along those lines, and it is objected that this is not proper cross-examination.

A. I have seen very few of them installed in the last ten years.

Q. 101. By Mr. Blakeslee: The inertia effects today in such pipe-lines are taken care of by a governing mechanism, including by-passes and the like? It that not correct?

A. By-passes and deflecting nozzles.

Q. 102. And where such by-passes are success-

fully employed such air chambers are not to be found, are they?

A. If the by-pass is accurately figured an air-chamber would be unnecessary.

Q. 103. Did you personally inspect the so-called by-pass feature of this Power Development Company plant as to its inner working parts or obscured working parts, if there were such?

Mr. Westall: Objected to as not proper cross-examination.

A. I did not.

Q. 104. By Mr. Blakeslee: If you were informed that such by-pass features of said Power Development Company plant were removed and the opening of the tail-race at such by-pass device were capped or plugged up when the Girard wheels were removed from that installation, what would be your general conclusion in view of your observations of the attempted operation of that plant, as to the general causes of removing such apparatus?

Mr. Westall: Objected to. The witness has not qualified to testify as an expert in regard to matters inquired about, and this is not proper cross-examination.

A. The by-pass and governor mechanism was a part of the Girard water-wheel installation, and when it was removed I would assume that it would be natural to remove everything connected with it. I am not familiar with the governor that Mr. Knight put on his wheel at Bakersfield, nor the governor that was attempted to be used on the Tuthill wheels.

Q. 105. By Mr. Blakeslee: The by-pass in the pipe-lines could have been used with either one of the Tuthill or Knight wheels, so far as you know—the general type?

A. It could.

Q. 106. Referring to Defendant's Exhibit Journal of Electricity, volume 4, No 6, page 110, can you say whether the cut in the upper right-hand corner of this page represents conditions in any way of apparatus at this Power Development Company plant when you were there?

A. I would judge that that was a photograph of the apparatus as it was installed at the plant.

Q. 107. Would you judge that was a photograph of the completed apparatus taken after it had been operated?

A. I can't tell you.

Q. 108. Is there anything about it that appears to indicate that it was not ready for operation?

A. No, except the housing had been removed.

Q. 109. Assuming that the efficiency found by Mr. Cobb in his test of the Power Development Company plant with full load of 700 to 705 horsepower was 80 per cent, would you consider that that was a good efficiency for the Girard wheels?

A. I would consider 80 per cent good efficiency at that full load.

Q. 110. When did you see the hydro-electric power plant provided with a by-pass in the pipe-line or penstock? That is, after the year 1897?

A. I have never seen any other water-wheels with a by-pass since.

Q. 111. You stated awhile ago that you knew of their use and of the use of deflecting nozzles for wheels. What was your source of knowledge as to these features?

A. I didn't know of any specific case where they are used where they would use a by-pass. I myself, if I were designing a wheel, would either use a deflecting nozzle or a by-pass.

Q. 112. You stated that you knew of the use of deflecting nozzles and by-pass.

A. I judge that it had been used. That is all,—knowing the art.

Q. 113. You have seen deflecting nozzles in operation?

Mr. Westall: Objected to as not proper cross-examination.

A. Yes sir.

Q. 114. By Mr. Blakeslee: Haven't you seen such hydro-electric power plants with relief valves and by-pass valves or discharge valves in the pipelines?

A. I have never seen one operated. I have never seen one, in fact.

Q. 115. You have never been along the line of the Los Angeles Aqueduct and seen power stations in Inyo county?

A. No; I have not been to the head of the aqueduct.

Q. 116. And never have seen any of the instal-

lations of the several large lighting and power companies of this state, with the exception of the installations of your own company, which is the Southern California Edison Company?

A. I have visited other power-houses, many of them, but most all the power-houses that I visited used deflecting nozzles.

Q. 117. Then you explain this by stating that the power-houses which you have seen employ the deflecting nozzle more particularly?

A. Yes sir.

Q. 118. Do you happen to know of an installation being designed now by the Pelton Water-Wheel Company for the Pacific Gas & Electric Company?

Mr. Westall: Objected to as not cross-examination.

A. I do not. I have not been out in the field very much lately.

Q. 119. By Mr. Blakeslee: How long since you made a trip through the field to inspect a string of hydro-electric power installations?

A. Last summer I went through plants in the vicinity of Vancouver.

Q. 120. Have you during the last four or five years made any extensive inspection of the hydro-electric power plants of California?

A. I have not.

Q. 121. Your work has confined you during the last four or five years more particularly to Los Angeles and to your office?

A. Yes sir; Los Angeles and vicinity.

Q. 122. But you know through publications and contact with the art and with the engineering profession in which you are engaged that usually either the deflecting nozzle or the by-pass in the penstock is employed in connection with governors for hydro-electric power plants at the present day. Is that generally so?

A. That is generally so where the flow of water is required to be constant.

Mr. Blakeslee: That is all.

REDIRECT EXAMINATION

By Mr. Westall:

Q. 123. It was a fact, was it not, that deflecting nozzles were used at Bakersfield plant with some of the wheels that replaced the Girard wheel, and that, therefore, the by-pass valve arrangement was not needed, the water thrown off of the wheel being in effect a by-pass?

Mr. Blakeslee: Objected to as leading and suggestive and, furthermore, as in direct contradiction of the answer in the affirmative to the testimony of the present witness who testifies that he does not know with respect to the specific installation made when the Girard wheels were removed, but only knows the types of the wheels.

A. I know nothing of the details of the wheels that followed the Girard, except from hearsay. After installation of the Knight wheel the power being abundant to run our generators, I took no more interest in it.

Q. 124. By Mr. Westall: You have stated that in a general way through publications and other sources that you know that some sort of a by-pass arrangement was used in addition to the common form of deflecting nozzle. Isn't it a fact that the device you refer to could more properly be called an auxiliary relief nozzle, inasmuch as it did not constantly allow a flow of water from the pipe-line in the same sense as that used at Bakersfield?

Mr. Blakeslee: Objected to as leading and suggestive and manifestly an attempt to instruct the witness and not particularly to question him, and as calling for a conclusion

Mr. Westall: It is to be noted that this is in effect a cross-examination on matters that have been first brought out by complainant in making the witness his own.

Mr. Blakeslee: And we will object further that this is not proper redirect examination, and that there is no propriety in such attempt at cross-examination of counsel's own witness by himself.

A. I am not at all familiar with the modern methods of by-passing. I simply assume that if a deflecting nozzle is in use some other means must be used to enable the flow of water to be constant.

Q. 125. You have not for some time been especially engaged in hydraulic work, have you?

A. Very little.

Q. 126. So that you have not kept abreast of the latest developments of that art, have you?

A. I have not.

Q. 127. In regard to the general use of air chambers, therefore, as compared with the use of those devices in 1896 and 1897, you could not speak authoritatively, could you?

Mr. Blakeslee: Objected to as calling for a conclusion.

A. I could not.

Q. 128. By Mr. Westall: You know, do you not, that in 1896 and 1897 it was generally considered good engineering practice to have an air chamber on all pipe-lines in order to take care of extraordinary pressures which might occur in the pipe-line?

Mr. Blakeslee: Objected to as grossly leading and suggestive and manifestly not redirect examination, but, if any examination at all, purely a cross-examination of counsel's own witness.

Mr. Westall: It is admitted that it is cross-examination.

Mr. Blakeslee: Upon that admission the court will be asked to strike such purported examination of this witness subsequent to the cross-examination from the record, and withhold it from consideration as entirely improper.

A. The use of air-chambers was commonly known and used a great deal in the mining sections as a safeguard against the ramming effects on the pipe-line.

Q. 129. By Mr. Westall: So that it is a fact that where an engineer was putting in a plant, irrespective of his opinion as to the absolute safety of the governing mechanism, if he exercised all due caution at the time to which you have referred, 1896 and 1897, he would

have been very likely to equip his plant with an air-chamber. Is that not true?

Mr. Blakeslee: Objected to as grossly leading.

A. I should say it was.

Q. 130. By Mr. Westall: Did the Lighthipe governor to which you have referred ever come into extensive use?

A. Not at all. I invented the governor simply to make one plant work in which I hadn't any available commercial governor which would operate sensitively enough, and I invented the governor to make the plant operative. That is all.

RECROSS-EXAMINATION.

By Mr. Blakeslee:

?

Q. 131. Even if you are not engaged specifically in hydraulic engineering, you are well acquainted and have been well acquainted for the last twenty years with conditions attaching to pipe-lines in supplying water to hydro-electric plants?

A. I have.

Q. 132. And any man engaged in electrical engineering in connection with hydro-electric power plants would, as you have done, take into consideration the conditions attaching to the supply of water to wheels for generating energy through electrical apparatus under his control. Is that not correct?

A. Yes, sir.

Q. 133. And those air-chambers on the pipe-lines which you say have not been used to any extent in recent years, were particularly necessary on the pipe-lines of the plants where poor governing produced or

tended to produce rams in the pipe-line. Is that not correct?

A. I think the air-chambers were put in as an extra precaution, because the art of governing was new and they took extraordinary precaution to protect everything.

Q. 134. In other words, if the governing were satisfactory these inertia effects in the pipe-line would not have been present to require the use of such an air-chamber. Is that not correct?

A. If the valves were properly designed I can see no use for the air-chamber. It was used as an extra precaution.

Q. 135. You never saw the by-pass device of the Power Development Company actually discharge water into the tail-race?

A. I could not. It went directly down in the tail-race and, of course, you could not see the water till the exit of the building.

Q. 136. And you never attempted any investigation?

A. Oh, no. The suction in that tail-race was enough to almost pull you down. The tail-race was rather small.

Q. 137. And the recent elimination of such air-chambers from such pipe-lines you can ascribe, can you not, to the provision of such governing apparatus, that the inertia effects in the pipe-lines are taken care of. Is that not correct?

A. I would say that the elimination of the air-chamber is due to the competence of modern governing.

Mr. Blakeslee: That is all.

Mr. Westall: Counsel for defendant produces and offers in evidence a certified copy of the file wrapper and contents of Letters Patent of Newton Lamb, No. 668801, granted February 26, 1901, for improvement in regulating devices in impact water-wheels, and ask that the same be received in evidence and marked Defendant's Exhibit File Wrapper and Contents Lamb Patent No. 668801.

Mr. Blakeslee: The offer of this exhibit is objected to in so far as it is attempted thereby to prove anything further than the issuance of the Lamb patent in question, on the ground that the said Lamb patent is set up in the answer in this case purely and solely as a publication prior to the invention of the subject of the Lyndon patent in suit, and that, therefore, in any other or further respects this file wrapper and contents of the Lamb patent cannot be employed in defense in this case in any other or further respects.

(The said exhibit so offered in evidence is marked as "Defendant's Exhibit File Wrapper and Contents Lamb Patent No. 668801," and together with the title of the court and cause and the date upon which the said exhibit was offered.)

May 26, 1914. A. M.

L. L. McAFEE, produced as a witness on behalf of defendant, being first duly sworn, deposed as follows:

DIRECT EXAMINATION.

By Mr. Westall:

Q. 1. State your name, residence, and occupation.

A. L. L. McAfee; residence, Independence, Inyo county, California; occupation, power-house operator.

Q. 2. How long have you been employed as operator in charge of—Did you name the plant?

A. Division Creek No. 2.

Q. 3. How long have you been employed as operator in charge of Division Creek No. 2 power plant?

A. Four years. It will be four years on the 13th of August.

Q. 4. Are you familiar with and do you understand the operation of the machinery and devices in use in said Division Creek No. 2 plant?

A. Yes, sir.

Q. 5. How much of the time during your employment as operator in charge of the plant referred to have you been able to observe the operation of the various devices and machinery in use in said plant?

A. Always when I was working on shift at all. I am with it all the time. I always see every movement.

Q. 6. How many units are installed in the Division Creek No. 2 plant referred to?

A. One.

Q. 7. Describe in a general way the means by which water is directed to propel the wheels in the plant referred to.

A. It is directed through a penstock and from the penstock onto the wheels through a nozzle and needle, with an auxiliary valve—

Q. 8. You need not touch that. Just read over the question.

(The question No. 7 is read by the Examiner.)

A. That is all there is that I know of; just what I have given.

Q. 9. You may state how, if at all, the amount of water projected against the buckets of the wheel is regulated in Division Creek No. 2 plant about which you have been testifying.

A. It is regulated with the action of the needle.

Q. 10. Which needle do you mean?

A. The large needle; the main needle.

Q. 11. In the main nozzle?

A. Yes, sir.

Q. 12. And how does that action of that main needle regulate the supply of water which is delivered to the wheel?

A. It is regulated by the governor through the fluctuation or variation of the load.

Q. 13. And when more water is needed on the wheel how does the needle operate?

A. It opens up.

Q. 14. And when the wheel carries less load how does the main needle operate?

A. The main needle closes.

Q. 15. Now, what means, if any, are employed to maintain a constant flow of water in the pipe-line? That is, to keep the flow constant. What means, if any, are used?

A. I have not any only while the plant is in operation the water is going through the nozzle.

Q. 16. Have you among the various devices about which you have been testifying a by-pass inserted in the penstock or flume at a point near the water-gate?

A. Near the water-gate?

Q. 17. Yes.

A. Yes, sir.

Q. 18. Will you please describe the by-pass that you have mentioned and also state how it is used.

A. My understanding of the by-pass—

Q. 19. That is, this by-pass?

A. Yes, sir. It is on the main gate-valve before entering the reducer, and there is around the gate another pipe leading or going around the main gate, with a gate-valve in it. In closing the big gate this has to be left open, as a relief in order that the big gate can be closed. Then afterwards the relief or by-pass is closed.

Q. 20. This is then a hand-operated by-pass not connected with the governor?

Mr. Blakeslee: Objected to as leading and suggestive.

A. Yes, sir.

Q. 21. By Mr. Westall: And at the point at or near the by-pass you have spoken of have you any means of controlling the water by any main gate? That is to say, is there a main water-gate?

A. Near the by-pass?

Q. 22. Yes.

A. Yes, sir.

Q. 23. And how do you control the flow of water through that main gate?

A. By opening it or closing it.

Q. 24. Is that done automatically by the governor?

A. No, sir.

Q. 25. How is it done?

A. By elbow power; by hand.

Q. 26. When do you use that by-pass and main gate that you have spoken of?

A. In emergency cases.

Q. 27. What would you consider one of those emergency cases?

A. Well, in case of obstructions or something are ahead of the needles so that it cannot close them, or something went wrong with the wheel at a time when I couldn't get the machine shut down, it would be necessary to close the valve.

Q. 28. And you would then, I understand, close the main gate or partially close this main gate by hand?

A. I would close it by hand; yes, sir.

Q. 29. And at the same time would you do anything with the by-pass which you have spoken of?

A. Not till I got the main gate closed.

Q. 30. Then what would you do?

A. I would close the by-pass.

Q. 31. And is that closing of the by-pass independent of the closing of that main gate?

A. Yes, sir.

Q. 32. There is no mechanical connection between the by-pass that you have mentioned and the hand-operated water-wheel that you have mentioned, is there?

Mr. Blakeslee: Objected to as grossly leading and suggestive, not the proper method of proof, and that the proper way to draw from the witness testimony as to this plant should not be by testimony by counsel.

A. No, sir.

Q. 33. By Mr. Westall: State what, if any, means are provided in the Division Creek No. 2 plant to guard against excessive pressures in the pipe-line.

A. That is by the relief nozzle or auxiliary.

Q. 34. Please state in a general way the construc-

ion and mode of operation of the auxiliary relief nozzle referred to in your last answer, and describe how it operates to protect the pipe-line from excessive pressure.

A. The auxiliary or relief nozzle is supposed to be a relief, and which is a relief to the pipe-line in surging or sudden loads—overloads—of any kind that may come on and cause the big needle to open suddenly. The relief nozzle is supposed to take care of that in the opening or closing suddenly of the main needle.

Q. 35. Can you describe in a general way the relative movements of the main needle nozzle and the auxiliary relief nozzle during the normal operating conditions of Division Creek No. 2 plant.

Mr. Blakeslee: Objected to as indefinite unless counsel defines what he intends to convey by the use of the word “normal”, as the witness has not testified to any distinction as between operating conditions of this installation.

Mr. Westall: Cross out “normal” and insert “ordinary”.

Mr. Blakeslee: The same objection to the use of the word “ordinary”.

Q. 36. By Mr. Westall: State in a general way the movements of the main needle nozzle and the auxiliary relief nozzle during ordinary operating conditions of Division Creek No. 2 plant.

A. Under the ordinary conditions of operation now the auxiliary is always closed.

Mr. Blakeslee: We object to the answer and ask that it be stricken out as not responsive to the question.

A. The auxiliary is always closed, as I have said, un-

less there is a load comes on of some kind—a heavy load—of 80 or 100 kilowatts, the auxiliary doesn't move. The way the constant load is now the auxiliary is always closed, as I have stated.

Q. 37. Have you at any time observed especially or kept any record of the number of times during any fixed period that the auxiliary relief nozzle opened?

A. Yes, sir.

Q. 38. When did you make those observations and how long did you continue to note those matters especially?

A. I have been watching it| for movements since about the 15th of this month, and the auxiliary relief never opened till I forced a heavy surge on the pipeline to make it open to see if it was working properly.

Q. 39. Please state if you know approximately how often during the same period of time the main needle moved toward either open or closed position?

A. It is continuous at the time I am running. It is always opening and closing to adjust the speed.

Q. 40. How is the period during which you have given especial attention to the movements of this auxiliary relief nozzle compared as to normal operation of the plant with other periods during which you gave no especial attention to the movements of that auxiliary relief nozzle?

Mr. Blakeslee: Objected to as indefinite, no object of comparison or basis of comparison being given.

A. Well, during the time that we had the dipper dredge working it caused a heavy fluctuation in the load, and they would work constantly then,—both the relief or auxiliary and the main needle.

Q. 41. By Mr. Westall: But during the time that you did not have this dipper dredge in operation how did the auxiliary needle-valve operate as to opening under changes of load?

A. If we had other loads, which we did have, which was steady, the auxiliary stayed closed until some sudden surge of load would drop off causing the speed to run up and the main needle would naturally close and the auxiliary would open to give the relief water the water-hammer in the pipe-line.

Q. 42. During the entire course of your employment as operator in charge of the Division Creek No. 2 plant, on an average approximately how many times a week or month has the auxiliary relief nozzle opened, if you can state?

A. May I add a little to that answer to contradict the first question asked me?

Q. 43. Yes.

A. I was officially in charge like I am now of the plant until August 15, 1913.

Q. 44. What was your connection with the plant prior to that time and during the four years that you have mentioned?

A. Much the same as I am now. I was operator, only we were running more shifts.

Q. 45. I do not believe that that previous question put was answered. During the entire course of your employment as operator in charge of Division Creek No. 2 plant, on an average approximately how many times a week or month has the auxiliary nozzle opened, if you can state? I guess we will have to change that. Make

it during the course of your connection with the Division Creek No. 2 plant.

A. Well, I couldn't exactly state the times.

Q. 46. Can you approximate it in any way? That is, give a general idea of how often it opened, from your observation.

A. Now or during the whole time?

Q. 47. During the whole period, roughly speaking.

Mr. Blakeslee: Objected to as calling for an arbitrary answer impossible from the very testimony of this witness who says he has not definitely watched or studied the movements of the auxiliary by-pass valve or by-pass valve to determine how much it worked, that is, how much of the time, until the last ten days.

A. Well, there was for three years of the time that that auxiliary or relief and the main needle were operating continuously, due to heavy fluctuations in the load. But since August 15th of last year the load has been practically steady and the auxiliary has had no chance very much, only to remain closed.

Q. 48. By Mr. Westall: What effect, if any on the velocity of the water in the pipe-line has the auxiliary relief nozzle referred to during the ordinary operating condition at the Division Creek No. 2 plant?

Mr. Blakeslee: Objected to as indefinite. Does this question include operation of both main and auxiliary nozzles?

A. I couldn't say that it has any.

Q. 49. By Mr. Westall: What is the usual normal condition of the valve or auxiliary relief nozzle during ordinary operating condition?

A. Closed.

Q. 50. State whether or not during ordinary operation of the plant when the needle of the auxiliary nozzle is in its ordinary closed position, as you have testified to, water escapes constantly or at all through the auxiliary relief nozzle.

A. It does.

Q. 51. To what extent does water escape through that valve?

A. You mean about how much?

Q. 52. Yes. I mean in a general comparative way.

A. Probably 20 or 25 gallons per minute, as near as I can count up.

Q. 53. What is the cause, if you know, of the escape of water through that closed valve?

A. It is due to the needle and needle-seat being pitted and worn by the continuous flow of gravel in the water, and is often caused by obstructions of some kind coming in ahead of the needle or between the needle and the needle seat, not allowing it to close the way it should.

Q. 54. Do those obstructions get into the main needle as well as the auxiliary needle?

A. Yes, sir.

Q. 55. And does the main needle as well as the auxiliary needle become pitted and worn in that way?

A. Yes, sir.

Q. 56. When the needles and the nozzle device are new is there any appreciable escape of water during closed position of the valve?

A. No, sir.

Q. 57. Can you produce any of the needles or tips that have been used at the Division Creek No. 2 plant?

A. Yes, sir.

Q. 58. Will you please do so?

A. (Witness produces an iron implement.) This is the main needle and this is the main needle seat.

Q. 59. When was this main needle that you have pointed out used at the Division Creek No. 2 plant? How long was it used and when was it removed?

A. Do you wish me to state from the time the needle was put in first to my knowledge?

Q. 60. Yes.

A. The plant was installed some time in 1909 and, as far as I know, this needle and needle seat was never changed until I changed them in 1911, between the dates of September 15th and October 6th, 1911.

Q. 61. Why were they changed?

A. Because we discovered a continuous leak of water all the time around the big needle which would prevent the stopping of the machine when the needle was closed or seated in the needle-seat.

Q. 62. What do you call that?

A. I have always called this the needle-seat and this could be called the tip.

Q. 63. The needle-seat to which you have referred or nozzle-pit, was that taken out at the same time that the needle was changed?

A. Yes, sir.

Mr. Westall: Counsel for defendant offers in evidence the needle referred to by the witness and also the needle-seat or nozzle-pit, and ask that they be received in evidence and marked respectively, "Defendant's Exhibit Division Creek No. 2 Main Needle" and "Defendant's Exhibit Division Creek No. 2 Main Needle Seat".

A. I wish to make a further statement. I was not

in charge of the plant only at the time of taking the responsibility while running my shift. I was not in charge of the place, but there was a man in charge of the place.

(The said exhibits are respectively marked, "Defendant's Exhibit Division Creek No. 2 Main Needle" and "Defendant's Exhibit Division Creek No. 2 Main Needle Seat", each together with the title of the court and cause and the date upon which it was offered in evidence.)

Q. 64. By Mr. Westall: Were any changes made in the needle or needle-seat of the auxiliary relief nozzle of Division Creek No. 2 plant?

A. Yes, sir.

Q. 65. Can you state when and why and under what circumstances they were made?

A. The needle-seat was changed due to being worn from gravel and so forth the same as the main needle seat was.

Q. 66. Was the auxiliary needle changed?

A. No, sir.

Q. 67. When was the change made that you have referred to?

A. From September 15th to October 6th, 1911. The change was made during that time—in 1911.

Q. 68. Can you produce the old needle-seat of the auxiliary valve that you have referred to?

A. Yes, sir.

Q. 69. Please do so.

A. (Witness produces a needle-seat.)

Q. 70. How long was it, if you know, at Division Creek No. 2 plant before it was changed?

A. So far as I know it has been used the same as the other one has, ever since the plant was installed.

Q. 71. Why was this change made?

A. Due to wearing out of the needle-seat from gravel.

Q. 72. After putting on the new needle-seats was there any appreciable escape of water from either the main nozzle or the auxiliary nozzle?

A. Yes, sir.

Q. 73. So that when the apparatus is in good condition and is not worn, when the auxiliary relief nozzle is closed there is no escape of water?

A. No, sir; if everything is normal and no obstructions in it, and it closes, there is no leakage.

Mr. Westall: Counsel for defendant offers in evidence the needle-seat last referred to by the witness and asks that it be received in evidence and marked, "Defendant's Exhibit Division Creek No. 2 Auxiliary Needle Seat."

(The said needle-seat so offered in evidence is marked "Defendant's Exhibit Division Creek No. 2 Auxiliary Needle Seat," together with the title of the court and cause and the date upon which said exhibit was offered.)

Q. 74. By Mr. Westall: I now call your attention to Complainant's Exhibit V and ask if you understand the construction, uses and purposes of the device such as therein attempted to be illustrated, and, if so, to state briefly what you conceive to be represented by the exhibit referred to.

A. The part marked "Water Gate Stem, M M," is the main needle and nozzle. The part marked "By-pass Valve Stem" is the auxiliary nozzle and needle.

Q. 75. Still referring to the same exhibit, namely,

Complainant's Exhibit V, you will notice that there appears to be a discharge of water illustrated from the auxiliary relief nozzle. Assuming that this is intended to show or convey the idea that there is a constant discharge of water from the auxiliary relief device here of the No. 2 plant about which you have been testifying, what have you to say as to the correctness of the drawing as an illustration of the main nozzle and auxiliary relief nozzle at Division Creek No. 2 plant?

A. The continuous flow of that water over the needle or through the needle seat would be caused by the needle not seating properly, or the wearing out of them, and it would be the same on the main needle. That needle might not be adjusted properly and that would cause the same thing. Is that what you want to know—what would do it?

Q. 76. No. I want to know if that is supposed to illustrate the Division Creek No. 2 devices. Whether that correctly shows the operation out there under normal conditions.

Mr. Blakeslee: Objected to as leading and suggestive. Let the witness compare this drawing with any showing they have.

A. No, sir; it does not.

Q. 77. By Mr. Westall: Again referring to Complainant's Exhibit V, please state whether or not there are any means on the stem or rod U U U to prevent the needle of the auxiliary relief nozzle from reaching full closed position, assuming that it is attempted therein to show the device in use at Division Creek No. 2 plant.

A. No, sir; there is not.

Q. 78. You notice that at the end of the rod marked

U U U on the exhibit referred to there appears to be a collar just outside of the oil dashpot which, if rigidly connected with the stem, might have the effect of preventing a full closure of the needle of the auxiliary relief valve. If that collar is intended to be illustrated as rigidly connected with the stem U U U, please state whether or not that correctly illustrates the corresponding devices in use at the Division Creek No. 2 plant.

Mr. Blakeslee: Objected to as leading and suggestive and not the proper method of proof and not the proper method of obtaining testimony as to the condition at the plant in question. Let the witness describe the means in question.

A. That collar is used merely as a guide on that stem, and always is mounted to the dashpot and is used inside as a stuffing-box or packing-box for this auxiliary stem U U U to operate back and forth inside of that collar.

Q. 79. By Mr. Westall: So, if I understand your description of the device, there is no means on the rod U U U or any of its connecting parts to prevent the needle of the auxiliary valve from reaching full closed position?

A. No, sir.

Q. 80. Now, you have spoken of the amount of leakage owing to the pitted and worn condition of the needle seat of the auxiliary nozzle as well, perhaps, as that of the needle therein. Can you state in a general way how much that leakage amounts to, and also state how your means of knowledge, if you have any definite knowledge on that subject—

A. Yes, sir. It is leaking twenty or twenty-five gal-

lons per minute and it is due to the needle-seat being worn.

Q. 81. When did you measure the amount of leakage, if at all?

A. On the 21st of May, 1914. I measured the water and I got approximately from 20 to 25 gallons per minute. And on the 23rd of the same month I measured it and got nearly 50 gallons. Between 40 and 50 gallons per minute.

Q. 82. Does the leakage of that water help the plant in any way? Is it a good thing for the plant?

Mr. Blakeslee: Objected to as leading and suggestive. Let the witness testify what ^{the} effect of this leakage is.

A. No, sir; it is not a good thing for the plant.

Q. 83. By Mr. Westall: Will you please state in a general way why that leakage is not desirable?

A. Well, I would consider it not desirable because a leakage like that will continuously wear on the parts that it is going against, and there are various reasons that it would be a detriment, although not a great detriment to the plant.

Q. 84. By Mr. Westall: It does not assist in the governing in any way, does it, to allow that leakage.

Mr. Blakeslee: The same objection.

A. No, sir.

Mr. Westall: I believe that is all.

CROSS-EXAMINATION.

May 26, 1914. P. M.

By Mr. Blakeslee:

Q. 85. I show you Complainant's Exhibits H, I, J, K and L, being photographs, and covering up the titles

of the photographs I ask you if you know what these photographs show generally. Take this first one, Complainant's Exhibit H.

Mr. Westall: Objected to as not proper cross-examination.

Mr. Blakeslee: The present witness has testified that he has been employed in connection with the operation of a certain plant for power generation, and has described certain portions of that plant and stated the operations thereof. Thus manifestly the door is open to cross-examination as to any of the features of construction and operation of this plant, particularly as the witness has testified that he has had the operation of the plant in charge and is now in charge thereof, and has studied its operation.

Mr. Westall: It is pointed out that the questioning does not cover or attempt to cover any of the matters touched upon in the direct examination, but is clearly an attempt on the part of counsel for complainant to prove his prima facie case on cross-examination of this witness.

Mr. Blakeslee: The question and answer that will be given by the witness will speak for themselves, taken in connection with the statements above made, and the previous testimony of the witness.

A. That shows the governor and the—

Q. 86. By Mr. Blakeslee: I don't care for all the details, but just generally.

A. It shows a general description of the operation of the governor and main needle and auxiliary part of the plant.

Q. 87. Of what plant?

A. Division Creek No. 2.

Q. 88. Is this the same plant that you have testified about as having been connected with for the last four years?

A. Yes, sir.

Q. 89. Now, please testify in the same manner as to this photograph, being Complainant's Exhibit I.

A. This shows the main needle stem and nozzle and also part of the auxiliary or relief nozzle of the same plant.

Q. 90. Now, please testify in the same manner with respect to this photograph, Complainant's Exhibit J.

A. That shows the water-wheel governor and main nozzle and needle of the same plant, Division Creek No. 2.

Q. 91. And also further with respect to Complainant's Exhibit K.

A. That shows the governor of Division Creek No. 2 plant.

Q. 92. And also with respect to the photograph Complainant's Exhibit L.

A. This shows the water-wheel housing at the Division Creek plant.

Q. 93. All of these photographs represent from varying view-points and in different details parts of Division Creek No. 2 power plant on the line of the aqueduct of Los Angeles, California, such power plant being situated in Inyo county near the town or city of Independence? Is that not correct?

Mr. Westall: The same objection.

A. Yes, sir. It is 12 miles from the town. That is our post-office.

Q. 94. By Mr. Blakeslee: How far is this plant from Lone Pine, if you remember?

Mr. Westall: Objected to for the same reasons as before noted, and because the witness has not been properly qualified to give his opinion as to matters of distance, and not the best method of proof.

A. It is between 28 and 30 miles. I can't say positively.

Q. 95. By Mr. Blakeslee: Both of those towns are in Inyo county, are they not?

A. Yes, sir.

Q. 96. Are you a mechanical engineer by profession?

A. No, sir.

Q. 97. Have you ever taken a course in mechanical engineering?

A. No, sir.

Q. 98. What experience have you had generally in fitting you for your present work?

A. Practical experience.

Q. 99. And was that experience gained in shops mostly?

A. No, sir; in power-houses.

Q. 100. Did you take any course at any time in electrical or hydraulic engineering?

A. No, sir.

Mr. Westall: The same objection is repeated to all this line of questioning and as not proper cross-examination.

Q. 101. By Mr. Blakeslee: Or mechanical engineering?

A. No, sir.

Q. 102. Did you have a general education in physics and mechanics at any time?

A. No, sir.

Q. 103. Who was in charge of Division Creek No. 2 plant which you have testified to, before August 15, 1913?

A. C. C. Ruble.

Q. 104. Is he connected with the operation of the plant at the present time?

A. No, sir.

Q. 105. Do you know where he is now?

A. He worked for the Pacific Light & Power Company on Big Creek where the new plants are.

Q. 106. Do you know whether he was a graduate mechanical or hydraulic engineer?

Mr. Westall: Objected to as not proper cross-examination, incompetent, irrelevant and immaterial.

A. No, sir; I do not.

Q. 107. By Mr. Blakeslee: The governor of the Division Creek No. 2 power plant (and when I refer to the Division Creek No. 2 plant I mean the plant you have testified about), is a governor sensitive or responsive to changes in speed of the water-wheel shaft, is it not?

A. Yes, sir.

Q. 108. And it includes in its make-up what are generally known as fly-balls which change their position when the speed of the water-wheel shaft decreases or increases. Is that not correct?

Mr. Westall: Objected to as not proper cross-examination.

A. Yes, sir.

Q. 109. By Mr. Blakeslee: These speed sensitive

devices are shown in Complainant's Exhibit J and Complainant's Exhibit K, being lettered in the latter exhibit C C, are they not?

Mr. Westall: The same objection.

A. Yes, sir. No. They are not. Do you notice the mistake?

Q. 110. By Mr. Blakeslee: I said they are shown there, but they are lettered in this one.

A. Oh, yes.

Q. 111. It is in Exhibit K that they are directly lettered C C?

A. Yes, sir; the governor balls are.

Q. 112. Then this governor apparatus is operated to act upon the water-wheel needle and the by-pass needle so as to change their position, then their positions are changed due to changes in speed of rotation of the water-wheel shaft? Is that not correct?

A. Yes, sir.

Q. 113. And I suppose it is fair to say also that the auxiliary needle has an independent movement whereby it returns to a certain position after it has moved with the water-gate needle? Is that not correct?

A. Do you mean needle?

Q. 114. Yes. By water-gate needle I mean the main needle.

A. Yes, sir.

Q. 115. Now, excepting when the auxiliary needle is returning independently to a certain position, that is, independently of the water-gate needle, this auxiliary needle moves inversely to the water-gate needle, does it not? That is, in a direction opposite of that in which the water-gate needle is moving?

A. It does that in case the main needle closes. The other one will move in reverse. That is, it will open.

Q. 116. I mean at these times the movement is in the opposite direction. If one is closing the other is opening?

A. Yes, sir.

Q. 117. And the water-gate needle—and I use this term as distinguished from the main water-gate that you have testified about—which I take it naturally shuts off the water and is shown in the upper central portion of Complainant's Exhibit H, is mechanically connected with your auxiliary needle so as to cause this inverse movement of the two needles. Is that not correct?

A. Yes, sir.

Q. 118. And the main water-gate referred to is shown, as stated, in the upper central portion of Complainant's Exhibit H, is provided with a hand-wheel. Is that not correct?

A. Yes, sir.

Q. 119. And this water-gate is operated by hand independently of the water-wheel gate or water-wheel needle?

A. Yes, sir.

Q. 120. And with the auxiliary or by-pass needle, is it not?

A. Yes, sir.

Q. 121. There is also a means provided at this plant whereby the water-wheel needle and the auxiliary needle may be jointly or at the same time or inversely and oppositely moved by hand?

A. Yes, sir.

Q. 122. And that is the part marked "Hand Oper-

ating Lever" in Complainant's Exhibits J and K, is it not?

A. It is marked "Hand Operating Lever".

Q. 123. This may be used to work the two needles, namely, the water-wheel needle and the auxiliary needle, simultaneously or at the same time, and inversely or oppositely through the rock-shaft or the like which swings on connecting rod II in Complainant's Exhibit HH?

A. Yes, sir.

Q. 124. And it is through that same connecting rod II that the two needles are operated by the features under control of the speed sensitive fly-balls. Is that not correct?

A. Yes, sir; where it is not the hand control. I thought you were dealing with the hand control.

Q. 125. I was, and now I am asking if the same motions are not imparted to oppositely move the main and auxiliary needles referred to through the same connecting rod when the governor is acting under control of the fly-balls. Is that not correct?

A. Yes, sir.

Q. 126. In other words, that hand lever simply enables the needles to be oppositely moved by hand to set them in any desired relative positions. Is that not correct?

A. You only set the one.

Q. 127. And which one?

A. The main needle.

Q. 128. But when they move in a closing direction the auxiliary needle will be moved in an opening direction, will it not?

A. Yes, sir.

Q. 129. And if then the motion of the main needle be reversed and the main needle be worked in an opening direction, the auxiliary needle will be moved in a closing direction, will it not?

A. Yes, sir.

Q. 130. And is it possible by means of this main lever to keep working these needles back and forth oppositely as long as desired?

A. Yes, sir, according to the load and variations.

Q. 131. I am assuming now that you are assuming the hand lever. It is possible, is it not?

A. Yes, sir.

Q. 132. And if heavy fluctuations of load or speed of the water-wheel shaft occur, then some back and forth movement of the main and auxiliary needles are in inverse or opposite directions?

A. Yes, sir.

Q. 133. And during such needle movement the water-wheel needle moves toward and away from its seat while the auxiliary needle moves oppositely or away from and toward this seat. Is that not correct?

A. Yes, sir.

Q. 134. And that always occurs, does it not, when the governor of this plant is operating and when extreme fluctuations of the speed of the water-wheel shaft occur?

A. Yes, sir.

Q. 135. And that was the case for the three years continuously when the dipper dredge was operated by power from this Division Creek No. 2 plant. Is that not correct?

A. Not alone. With the help of the Cottonwood

plant in parallel most of the time. These awful fluctuations in load came at odd times. The two plants were parallel and there was times when the Division Creek plant would have the load alone.

Q. 136. And whenever it carried the load of this dredger alone these extreme fluctuations took place, and when they took place the water-wheel needle and auxiliary needle constantly moved inversely, one moving toward its seat while the other moved away from its seat. Is that not correct?

A. Yes, sir.

Q. 137. And when these two needles, the main and auxiliary needle, are so moving inversely, the flow of the water through the pipe by-pass nozzle is diminished when the flow of water through the main nozzle is increased, and the flow of water through the by-pass nozzle is increased when the flow of water through the main nozzle is diminished. Is that not correct?

A. I don't see how you call that a by-pass nozzle in there.

Q. 138. Call it an auxiliary nozzle if you wish. Does not that I have stated take place?

A. Yes, sir.

Q. 139. What objection have you to calling an auxiliary or relief nozzle a by-pass nozzle?

A. The only objection is that it is my understanding of a by-pass—

Q. 140. What is your understanding of a by-pass?

A. I understand that a by-pass has, as I said before, is that relief valve around the main gates.

Q. 141. In other words, a valve which will pass water around the wheel. Is that not correct?

A. Around another gate or valve.

Q. 142. This auxiliary or relief valve nozzle and needle permits water which would otherwise pass to the wheel to be passed around or past the wheel, does it not?

A. Yes, sir; it does when it is not closed.

Q. 143. Then in the sense that this auxiliary or relief nozzle with its needle permits water to be passed around or beyond the wheel, this auxiliary or relief valve is a by-pass valve, is it not, as far as the wheel is concerned?

A. No, sir; it is not used as a by-pass. It is caused from other causes.

Q. 144. Where you have a stream of water flowing in one channel and you use part of that water to do certain work, and you divert a part of that water just before that point of work is reached, and conduct it around the point of work and bring it back again into the channel, to commingle again with the water that did the work, would you not consider the passage of the water around the point of work a by-passing?

A. Well, I would consider a by-pass in that way that it would deliberately divert that water around for a cause.

Q. 145. Now, in this Division Creek No. 2 plant that part of the water which would otherwise go to the wheel goes through the auxiliary or relief valve when that valve is open and, mind you, I say when that valve is open, and passes around the wheel and joins again with the water which has been directed to the wheel, so joining it in the tail-race beyond the wheel. Is not that correct?

A. Well, I can't see that that water is continually going through that auxiliary or relief nozzle while the main needle is working.

Q. 146. That is not my question. I will have to ask that it be stricken out as not responsive and will ask the Examiner to read the question again so that Mr. McAfee can reconsider it.

(The Examiner reads the question.)

A. May I ask if you mean that during the time that plant is in operation that the main needle is operating too?

Q. 147. No. I say that is correct when the auxiliary needle is open—the auxiliary valve is open?

A. If the main needle is closed and the auxiliary valve is open, it is not mingled with the water that is going through the wheel.

Q. 148. Quite right. We will assume that the main valve is partly open and the auxiliary valve is partly open. Now, how would it be?

A. I guess that would be all right.

Q. 149. Then under such conditions it would be fair to say that part of the water was being by-passed from the penstock around the wheel and into the tail-race. Is that not correct?

A. Well, it was not deliberately being by-passed due to our fault or anything of the kind. I would suppose that it would have to be considered by-passed.

Q. 150. It would be by-passed without any fault, but because the by-pass valve or auxiliary valve was partly open and was so open upon moving of the main valve in a closing direction, under the control of the governor. Is that not correct?

A. Yes, sir.

Q. 151. I show you Complainant's Exhibit O, covering up the descriptive matter, and ask you if you know what this photograph shows.

A. That is the dipper dredge.

Q. 152. The dipper dredge referred to in your previous testimony?

A. Yes, sir; I think so.

Q. 153. Can you say whether this dredge was used by the city of Los Angeles in connection with the construction of the Los Angeles aqueduct? And I mean the aqueduct of the City of Los Angeles, California, and can you say this of your own knowledge?

A. Yes, sir.

Q. 154. That is true, is it?

A. Yes, sir.

Q. 155. And did this dredge obtain its power in part from the Division Creek Plant No. 2 which you have testified about?

Mr. Westall: Objected to as not proper cross-examination and also on the ground that the witness has not been qualified to testify upon the subject inquired of him.

Mr. Blakeslee: The record plainly shows that the witness spoke of this dredge in his direct examination, and of the effect of the operation thereof upon the governing or the governing effects produced by the operation of this dredge in connection with the Division Creek No. 2 plant.

Q. 156. Now, supposing this dredge had been operated solely by power supplied by the Division Creek No. 2 plant, and the extreme fluctuation in water-wheel shaft

which you have testified about produced by the operation of this dredge had occurred, and the governing apparatus of this plant had not included the auxiliary or relief valve or by-pass valve, as you have admitted that they would be fairly called, but that the main water-wheel valve had alone been provided, what do you believe from your experience in this plant would have been the governing action obtained?

A. If the auxiliary or relief was not connected onto the governor, and if the main needle had to stand all the operation, with those heavy surges that would come on it it would have caused such a heavy water hammer in the line that it would have probably broke the pipe-line somewhere.

Q. 157. And that same liability of breakage would exist today at this same plant and does exist today if any such or similar extreme fluctuations in water-wheel shaft speed takes place? Is that not correct? That is, there would be the same danger of pipe-line breakage today as there was then if the same extreme fluctuations took place?

A. Yes, sir; if the auxiliary was not working.

Q. 158. In other words, no changes have been made from the condition of the plant during the three years when this danger of breakage existed had the auxiliary or by pass valve not been present. Is that not correct?

A. There has been none that I know of.

Q. 159. In other words, the general construction and outfit of this plant are substantially the same today as they were during the three years when this extreme fluctuation more or less constantly took place. Is that

not correct? Of course, assuming that small repairs and substitution of fresh parts may have been made?

A. Yes, sir.

Q. 160. And if the Los Angeles aqueduct should become clogged or partially filled in with soil or sand or other foreign substances, and it were necessary to do further dredging to free the aqueduct of such substances, and this same dredge or another like it were used for that purpose, and operated principally by power from Division Creek No. 2 plant, you would expect to have the same extreme fluctuations of speed of the water-wheel shaft of this plant, would you not?

A. Yes, sir.

Q. 161. And the same danger would be present, namely, of breaking the pipe-line, if the auxiliary by-pass valve were removed or thrown out of operation. Is that not correct?

A. Yes, sir.

Q. 161. And, therefore, it is your belief, is it not, that the installation of this by-pass valve has been a safeguard to prevent breakage of the pipe-line or penstock supplying water to the Division Creek No. 2 plant throughout the whole period of four years during which you have been connected with the operation of this plant. Is that not correct?

A. Yes, sir.

Q. 162. Now, furthermore, when these violent fluctuations in speed of the water-wheel shaft at this plant take place, or, in fact, at any similar installation, and the water-wheel gate or water-wheel needle move in a closing direction, the velocity of the water passing such

needle increases under ordinary conditions. Is that not correct?

A. Yes, sir. That is, when the main needle opens?

Q. 163. No. My question is this: When the main water-wheel needle or gate move in a closing direction there is a tendency for the velocity of the water passing such gate or needle to increase, is there not?

Mr. Westall: Objected to. The witness has not qualified as an expert witness on hydraulic engineering to testify to matters of theory as to water velocity and so forth, but merely as a practical operative in charge of the plant to describe what is in use out there at this time.

Mr. Blakeslee: Counsel has drawn from the witness testimony as to water measurement at this plant, and as to the flow of water at this plant past the auxiliary needle. We believe there can be no doubt but what the witness is capable of judging of changes of speed of flowing water and that he is capable of measuring flowing water.

Mr. Westall: The witness has testified that he measured the amount of water being by-passed, but he has not testified regarding the velocity or relative velocity of water.

Mr. Blakeslee: The question was directed to change of speed and velocity, not to the measurement of such varying velocities, and it is elementary that any person with good eyes can note changes in speed of moving velocities.

A. Upon my word of honor, I can't tell you. I surely cannot tell you how that would be. I know that if the needle was throwed wide open at any time, the further open it is throwed the greater velocity of the stream.

But where it is closed, as I get your question, I can't tell what it would be.

Q. 164. You don't know anything about the changes in velocity of the flow of water at the water-wheel gate or water-wheel needle immediately following closing or opening of such gate or needle? Is that correct?

A. Yes, sir.

Q. 165. You do know, however, I take ~~it, that~~ it, that the more or less sudden movement of the water-wheel gate or needle produces changing pressure effects in the penstock or pipe-line leading to the water-wheel. That is correct, is it not?

A. Yes, sir.

Q. 166. And the by-pass valve in this Division Creek No. 2 plant acts to counteract such changing pressure effects and to protect the pipe-line in the manner you have testified? That is correct, is it not?

A. The way I understand it that is what the auxiliary is there for—for relief.

Q. 167. And protection to the pipe-line?

A. Yes, sir; protection to the pipe-line from surges.

Q. 168. And by surges, I take it you mean changes in conditions of flow and pressure in the pipe-line?

A. There would be heavy surges against the water in the pipe.

Q. 169. And those surges produce rams on the pipe, do they not?

A. Yes, sir.

Q. 170. And these rams are broken up or their damaging effects protected by the operation of this relief valve or by-pass valve in this plant. That is correct, is it not?

A. Yes, sir.

Q. 171. Referring to Complainant's Exhibit V, you have spoken of the stem UUU as being a continuation of the by-pass valve stem. Am I to understand that this is all one piece straight through?

A. Yes, sir; this is.

Q. 172. What is the action of the part lettered "Oil Dashpot" in this drawing?

A. I will have to give that up. I never did know what good that dashpot done on there.

Q. 173. You never had it apart?

A. No, sir.

Q. 174. Then as you understand it every time that the stem of the needle of the water-wheel nozzle moved at all there must be a kick applied to the stem of the by-pass valve through the mechanical connection between these stems. Is that not correct?

A. No. The main needle can be shifted back and forth, if it shifted easy, without jerking or anything on that hand control, and still not move this. This can stay closed—this auxiliary—the auxiliary relief.

Q. 175. Now, the two needles, namely, the water-wheel needle and the by-pass or auxiliary valve needle, are mechanically connected, are they not?

A. Yes, sir.

Q. 176. What is there in this mechanical connection which permits one of these needles or the stem of the same to move without causing a movement of the other needle or the stem thereof?

A. Well, it is according to the amount of water that it is going to take to turn the generator. That is the way I would put it. This water-gate stem MM can be

moved a very little and start the wheel without moving this auxiliary or relief valve stem too much, and I would say that that is due to the spring that would take action in these springs on this oil dashpot here to keep it from moving, but just a very little move from the water-gate stem.

Q. 177. Then if those springs in the oil dashpot can work, there must be some break in the by-pass valve needle stem, must there not?

Mr. Westall: Objected to on the ground that the witness has testified that he does not understand fully the operation of the oil dashpot and the springs referred to, and that the question is clearly argumentative and attempting to argue the matter with the witness.

Mr. Blakeslee: The witness has testified of his own knowledge that the water-gate stem or needle of the water-gate or main valve can move slightly without movement at times with the by-pass valve or needle stem. He has also testified that there are mechanical connections between these stems or needles, and I wish to have him tell me how it is that these mechanical connections permit such slight movement at times of the water-wheel needle stem without accompanying movement of the by-pass valve stem. And it is to be remembered that the witness has been working at or in charge of this plant for four years, and I am asking him to tell me all he knows and no more.

Mr. Westall: The witness has testified that he has never taken apart the device and does not understand its construction. As a practical man he has testified as to the operation and effects that may result from certain operations, but he has also clearly testified that he

does not understand the mechanical connections sufficiently well to know how those effects are produced.

A. I don't know. I never had it apart, as I say, and I can't tell how it is. I don't know what the dash-pot is there for.

Q. 178. By Mr. Blakeslee: Then, as far as you understand the construction and connection of the water-gate needle stem and by-pass needle stem at Division Creek No. 2 plant, movement of the by-pass valve stem must occur when movement of the water-gate valve stem takes place, and in an opposite direction, excepting upon very slight movements of the water-gate valve stem as referred to by you. Is that not correct?

Mr. Westall: Objected to as not correctly stating the previous testimony of the witness. The witness did not testify that very slight movement of the main valve stem would not cause a movement of the auxiliary needle.

Mr. Blakeslee: We object to counsel coaching the witness who seems to be able to take care of himself, and would further call attention to the fact that this is cross-examination.

A. Yes.

Q. 179. Now, as a matter of fact, every time that the stem of the water-gate valve needle in this plant is moved, the connections between it and the by-pass valve stem must be somewhat modified. That is, the connections must be somewhat moved. Is that not correct?

Mr. Westall: Objected to as going into matters of theory not having been covered on direct examination, and as an attempt to argue the matter with the witness.

A. I do not remember the thing as it is given here.

I don't know what you may call this. As it is given here it looks to me as though there are two parts here.

Mr. Blakeslee: Well, I call your attention to Complainant's Exhibit I which you have identified as being the photograph of the corresponding parts of this plant. Now, in this photograph, the by-pass valve needle is operated through a rocking part NN, is it not?

A. Yes.

Q. 180. And that part NN also operates the stem of the water gate-valve needle, does it not?

A. I don't know. I couldn't tell you, because I don't see how that business can work there on those two—I don't see how those two arms connecting the two needles can work separately from this arm controlled from the governor.

Q. 181. Which arm do you mean is controlled from the governor?

A. KK.

Q. 182. Well, that rocking part NN is rocked by rocking the part KK?

Mr. Westall: Objected to as not proper cross-examination, this witness not having qualified to testify as an expert concerning the construction of the different parts inquired of, but only as to the general operation and effect.

Q. 183. By Mr. Blakeslee: Now, you have testified that you have been constantly employed in connection with the operation of this Division Creek No. 2 plant. That is correct, is it not?

A. Yes, sir.

Q. 184. The parts NN and KK shown in Complain-

ant's Exhibit J and Complainant's Exhibit I are parts of this plant, are they not ?

A. Yes, sir.

Q. 185. And those parts are at all times visible when the plant is in operation?

A. Yes, sir.

Q. 186. How many times do you suppose your eye has alighted upon these parts KK and NN during the last four years?

Q. 187. Then, as far as you have noticed, those parts have moved as one?

A. It is considered that way.

Q. 188. You never have noticed that one of these parts moved out of step with the other?

A. No, sir.

Q. 189. And that is what you assume and believe is their mode of operation?

Mr. Westall: Objected to as to what the witness assumes and believes. The cross-examination should go only to the evidence brought out on direct examination and not what the witness assumes and believes. The witness has not qualified, as has often been stated of record, to testify as an expert, but only as a practical operative of the plant referred to.

Mr. Blakeslee: Counsel seems to assume that nothing must be developed on cross-examination which is contrary to and out of parallel with the testimony drawn from the witness on direct examination. We are not asking the witness questions involving expertness at the present moment. The witness has stated that he has been for four years connected with the operation of this plant, and that the parts KK and NN have been

plainly visible during that time in this plant or are plainly visible, and the witness is being asked questions which fall directly within his experience in this plant, and his experience in connection with the plant was gone into extensively on direct examination. It is hard to conceive of any more proper question in cross-examination than those now being put.

Mr. Westall: The questions do not go to the experience of the witness in the operation of operations
1576 91½ A. They may have lighted on them thousands of times, but I never took any notice. I can't say whether they are working. It is a mystery to me. I have not noticed whether there are two parts here separately.

NN of Complainant's Exhibits I and J, in their operation, as you are with the operation of the fly-balls CC in Complainant's Exhibit H?

A. Yes, sir; I am as familiar with them as far as that goes, but I cannot give you an answer as to how those two separate parts were. It is impossible to do it.

Q. 191. Well, then, you believe, do you not, that these parts KK and NN move in unison or in step, and that when the part KK is moved the part NN correspondingly moves or rocks. Is that not correct?

Mr. Westall: Objected to as to what the witness believes, when he has stated that he does not know, and the witness is instructed that he need not attempt to answer a question more than once.

Mr. Blakeslee: The court will note the fact of this repeated attempt to instruct the witness, and the witness is asked to answer the question if he understands it. If not, the Examiner will read it to him.

A. As far as I have always thought or always knew,

ant's Exhibit J and Complainant's Exhibit I are parts of this plant, are they not ?

A. Yes, sir.

Q. 185. And those parts are at all times visible when the plant is in operation?

A. Yes, sir.

Q. 186. How many times do you suppose your eye has alighted upon these parts KK and NN during the last few

parts moved out of step with the other?

A. No, sir.

Q. 189. And that is what you assume and believe is their mode of operation?

Mr. Westall: Objected to as to what the witness assumes and believes. The cross-examination should go only to the evidence brought out on direct examination and not what the witness assumes and believes. The witness has not qualified, as has often been stated of record, to testify as an expert, but only as a practical operative of the plant referred to.

Mr. Blakeslee: Counsel seems to assume that nothing must be developed on cross-examination which is contrary to and out of parallel with the testimony drawn from the witness on direct examination. We are not asking the witness questions involving expertness at the present moment. The witness has stated that he has been for four years connected with the operation of this plant, and that the parts KK and NN have been

plainly visible during that time in this plant or are plainly visible, and the witness is being asked questions which fall directly within his experience in this plant, and his experience in connection with the plant was gone into extensively on direct examination. It is hard to conceive of any more proper question in cross-examination than those now being put.

Mr. Westall: The questions do not go to the experience of the witness but go to his opinion of operations and of constructions with which he has clearly stated several times he is not familiar.

Q. 190. By Mr. Blakeslee: You are as familiar, are you not, with the appearance of the part KK and NN of Complainant's Exhibits I and J, in their operation, as you are with the operation of the fly-balls CC in Complainant's Exhibit H?

A. Yes, sir; I am as familiar with them as far as that goes, but I cannot give you an answer as to how those two separate parts were. It is impossible to do it.

Q. 191. Well, then, you believe, do you not, that these parts KK and NN move in unison or in step, and that when the part KK is moved the part NN correspondingly moves or rocks. Is that not correct?

Mr. Westall: Objected to as to what the witness believes, when he has stated that he does not know, and the witness is instructed that he need not attempt to answer a question more than once.

Mr. Blakeslee: The court will note the fact of this repeated attempt to instruct the witness, and the witness is asked to answer the question if he understands it. If not, the Examiner will read it to him.

A. As far as I have always thought or always knew,

they did. But it is not in the investigation or anything of the kind that made me think it. I never really noticed that there was two parts on there, to give it any investigation. That is practically news to me right there on that one part.

Q. 192. To the best of your knowledge they do move in unison, do they not?

A. I think so; yes, sir. That is the only way I can answer you.

Q. 193. Now, when the parts KK and NN do move, motion is supplied to both the water-wheel valve stem, or the part which finally actuates the stem, and to the by-pass valve stem or the parts which finally actuate the same. Is that not correct?

Mr. Westall: Objected to as not proper cross-examination and as an attempt to have the witness testify as an expert when not properly qualified.

A. That question appears to me to come under the same head as the parts there. I don't know as they all move.

Q. 194. By Mr. Blakeslee: You don't know that the part NN moves?

A. At the same time—I don't know that the part NN moves at the same time KK does.

Q. 195. My question is when motion is imparted to the part NN. Not when it is imparted to KK.

A. When motion is imparted to the part NN you mean that it is moving both needles?

Q. 196. That it is moving both needles or the parts which directly move them.

A. Well, I would think that it did. I can't give you a positive answer.

Q. 197. That is the best of your knowledge, is it not?

A. Yes, sir.

Q. 198. Now, this speed-sensitive device, including the fly-balls CC shown in Complainant's Exhibit K and Complainant's Exhibit H, for instance, is operated by the power taken from the water-wheel shaft, is it not?

A. You mean the governor?

Q. 199. Read the question.

(The question is read.)

A. Well, I refuse to give any answer at all on the governor, because that is a part that I don't understand. I don't think there is a man on earth,—even the men that made the governor understand it. When it gets out of adjustment or anything we are stalled, that is all. There has been more men than me that has tried it and got stalled on it.

Q. 200. You mean more men than you that have tried to adjust it?

A. Yes, sir.

Q. 201. It is a very sensitive device, is it not?

A. I should say it is.

Q. 202. Now, I will try to ask a little more particularly. The fly-balls CC just mentioned are caused to rotate and move inwardly and outwardly in governor action by power taken from the shaft of the water-wheel. Is that not correct?

Mr. Westall: Objected to as not proper cross-examination and as having already been fully covered by previous answers of the witness.

A. I know that this part of the governor head—that includes CC—is belt-driven from the water-wheel shaft,

but I don't know any further connections through that governor that makes it control the speed.

Q. 203. By Mr. Blakeslee: That governor does very sensitively control the speed of the water-wheel, does it not?

A. Well, yes. I guess it does. That is what the governor is for.

Q. 204. Have you seen similar governors in use?

A. No; not till I came in contact with this one.

Q. 205. How many plants have you worked at before 1910?

A. Cottonwood and Nevada, California.

Q. 206. The Cottonwood plant referred to is the plant of the city of Los Angeles, California, on the line of the aqueduct of that city in Inyo county, is it not?

Mr. Westall: Objected to as not proper cross-examination.

A. Yes, sir.

Q. 207. And you say you have worked at one other plant before that?

A. Yes, sir.

Q. 208. And that was where?

A. In Nevada, California. It is known now as the Southern Sierras.

Q. 209. What kind of a governor did they have there?

A. A Lombard.

Q. 210. But not the same kind of a Lombard governor as at the Division Creek plant?

A. No, sir.

Q. 211. Nor the same kind of a Lombard governor as at the Cottonwood plant?

A. No, sir.

Q. 212. This governor in the Division Creek plant has operated successfully all the last four years?

A. No, sir; it has not operated successfully. It never has operated successfully.

Q. 213. In what respect has it not?

A. Well, sometimes it will work and sometimes it won't.

Q. 214. Where does the trouble take place?

A. I am not man enough to know where it is. I am not familiar enough with the governor to know.

Q. 215. You are in entire charge of it, are you not?

A. Yes, sir.

Q. 216. When anything occurs to it, what do you do?

A. I cut the governor responsible out and use it on the hand control.

Q. 217. And how often does that occur?

A. It don't occur very often.

Q. 218. As a matter of fact during all those three years under the heavy fluctuations that took place in the speed of the water-wheel shaft at Division Creek No. 2 plant, when it was supplying power to operate the dredge, this Lombard governor was practically continuously operating, wasn't it?

A. Yes, sir.

Q. 219. And it is practically continuously operating today?

A. Yes, sir.

Q. And has been during the last year?

A. Yes, sir.

Q. 221. As far as you know that is true of the Cot-

tonwood plant referred to, and the Lombard governor there?

A. Yes, sir.

Q. 222. Then when you speak of troubles I suppose you mean the usual troubles that are met with in the operation of any plant? That is to say, troubles occur here as they do in any plant, and you never knew of a plant in which they did not occur?

A. No, sir.

Q. 223. You could not put your finger on any particular trouble?

A. No, sir; I cannot on that governor there. When it is forced to work on surging loads or fluctuating loads the governor works, and it will control. But on a low load and steady load there is times when it won't work, and I have taken off the governor control and run it on hand control and got it back on governor control again, and it would work from causes unknown.

Q. 224. In other words, you gave it a little rest?

A. I guess that was the trouble.

Q. 225. And this governor is most useful when you have extreme conditions to deal with and extreme fluctuations in water-wheel-shaft speed such as you have testified about?

A. Yes, sir.

Q. 226. And that is the time when you most need the governor, is it not?

A. Yes, sir.

Q. 227. And when the speed of the water-wheel shaft is practically constant the governor is hardly needed?

A. No, sir; it is hardly needed.

Q. 228. In other words, if the fluctuations of speed of the water-wheel shaft are very small in percentage the wheel will practically take care of itself as to governing all the time, will it not?

A. Yes, sir; if there is no fluctuation in the load at all.

Q. 229. And even if a fluctuation is very slight, such as would hardly change the candle-power of an incandescent lamp, governing is scarcely needed?

A. Yes, sir. That would be proper. It is hardly necessary.

Q. 230. What you most need a capable governor for is correcting dangerous inertia effects in pipe-lines in preventing the governor overrunning, and getting a quick response to extreme changes or fluctuations in water-wheel speed. That is correct, is it not?

A. Yes, sir.

Q. 231. And this governor at the Division Creek No. 2 plant under these conditions, and to correct or prevent these troubles, operated and has operated during the last four years with satisfaction, has it not?

A. Yes, sir; it has

Q. 232. Who asked you, Mr. McAfee, to watch the movements of the auxiliary or by-pass valve at the Division Creek No. 2 plant from May 15th of this year on?

A. Mr. Doble.

Q. 233. How do you spell his name?

A. I think if he is the same man it is D-o-b-l-e.

Q. 234. How did he ask you? By letter or in person?

A. In person.

Q. 235. Was he up at the Division Creek No. 2 plant?

A. Yes, sir.

Q. 236. What was his business?

A. I don't know.

Q. 237. Do you know what company he is connected with?

A. No; he never told me.

Q. 238. Did he tell you whom he represented or what he wanted this information for?

A. No, sir.

Q. 239. Did he come with a permit for inspection from City Aqueduct Department or any member of the Board of Public Works?

A. I don't know, I am sure.

Q. 240. He did not say how he happened to be up there?

A. No, sir; he came with Mr. Van Norman.

Q. 241. Who is he?

A. He is chief field engineer of the aqueduct, I suppose.

Q. 242. And did he ask you to observe anything else in the operation of this plant besides the operation of the by-pass valve.

A. No, sir.

Q. 243. Did he tell you you were to testify in this case?

A. I believe he told me that I might be called upon.

Q. 244. He did not say he was connected with the Pelton Water-Wheel Company of California, did he?

A. No, sir.

Q. 245. He was a tall man, over six feet, with a

smooth face, and about forty years of age, wasn't he?

A. He was a medium tall man—yes; he is a tall man.

Q. 246. And he smiled all the time he was talking?

A. I don't know. I didn't take that in.

Q. 247. You would say he was about forty years old?

A. I should judge so; yes.

Q. 248. Where did you stand while you were observing the movement of the by-pass valve at this plant after May 15th of this year?

A. I stood right at the governor hand-operating control where it is marked "Lever" here.

Q. 249. And what part did you look at as shown in Complainant's Exhibit J in attempting to study the movements of this auxiliary by-pass valve or needle?

A. The part that I looked at was the dashpot. It was the auxiliary relief needle.

Q. 250. Can you point out the part you were looking at on Complainant's Exhibit J?

A. No, sir; it is not plain enough on there.

Q. 251. You say you stood near the hand-operating lever shown in Complainant's Exhibit J. Is that correct?

A. Yes, sir.

Q. 252. And in which direction were you looking in that photograph?

A. Down past the governor, down to the auxiliary relief nozzle in there.

Q. 253. And what did your eye see in looking in that direction?

A. And I shoved the main needle forward to give a heavy surge to see if the auxiliary would open, that is

when it opened; the instant that I gave the lever a throw forward.

Q. 254. Which way was this moving the main water-wheel needle?

A. Moving it into the needle-seat and shutting off all the water.

Q. 255. What part did you see move on the auxiliary needle?

A. All that part.

Q. 256. Marked what in Complainant's Exhibit I?

A. Well, it would be WW, SS.

Q. 257. Anything else?

A. Well, that OO points to that screw or whatever that is on there. Does that mean that this is the auxiliary—

Q. 258. We will say that that refers to the dash-pot. Did that move?

A. Yes, sir.

Q. 259. How far away did you stand from these parts you have just pointed out?

A. This distance across, which would be probably seven or eight feet.

Q. 260. And you could clearly notice the movements of these parts?

A. Yes, sir.

Q. 261. And they moved in a direction opposite to that in which the main water-wheel needle moved?

A. Yes, sir; when I threw that down and closed the main needle the auxiliary opened and then gradually closed.

Q. 262. Then when you stopped that movement the

auxiliary valve or by-pass valve also slightly returned or tried to return to a certain position, didn't it?

A. Yes, sir; to a closed position.

Q. 263. That is, in a closing direction?

A. Yes, sir.

Q. 264. Did you attempt to observe the movements of the main water-wheel needle and the auxiliary needle when the governor was operating automatically?

A. No, sir.

Q. 265. Your only study of these needles and the movements thereof was from the 15th of this month on, and was when you were using the hand-operating lever to move them. Is that correct?

A. Yes, sir.

Q. 266. That dredge shown in Complainant's Exhibit O is still in the aqueduct, ready to be operated by power from Division Creek No. 2 plant, is it not?

A. I don't know.

Q. 267. When did you last see it?

A. I haven't seen it for over a year. Possibly a year. I don't know.

Q. 268. You don't know that it has been removed?

A. No; I don't know anything about the dredge.

Q. 269. But you saw it in operation when it was working in the aqueduct?

A. Yes, sir.

Q. 270. You do not understand the mode of operation of the governor features of the Division Creek No. 2 plant other than those you have testified about, and particularly those shown in Complainant's Exhibits H, K, J, for instance, and marked YY, dashpot, FF, UU and EE?

A. No, sir; not well enough to give any explanation of it.

Q. 271. Is there anybody connected with that plant in the management of it or operation of it, or has there been anybody connected with that plant in the last year who understands its operation better than you do?

A. No, sir. He is going some if he does.

Q. 272. Now, this wear of needle valves and seats of the Division Creek No. 2 plants which you have testified about was due to the cutting effect of gravel and the like in the water, was it not, largely?

A. Yes.

Q. 273. And any such damage as is shown on the needle and two seats you have introduced as Defendant's Exhibits Division Creek No. 2 Main Needle and Division Creek No. 2 Main Needle Seat and Division Creek No. 2 auxiliary needle-seat, was caused by such cutting action of gravel in the water, was it not?

A. Yes, sir.

Q. 274. And these seats and valves operated all right in every other respect excepting as to leakage caused by such cutting, did they not?

A. Yes, sir.

Q. 275. And you used them until the leakage became such that you wanted to replace them with new ones that would not leak. Is that not correct?

A. Yes, sir.

Q. 275. And that rutting or cutting would occur on the surface of any kind or form of metal valve or valve-seat which you might use at this plant. Is that not correct?

A. I think it would.

Q. 276. And this cutting or rutting does not prevent the needles from seating, but only permits the escape of a certain amount of water through the cuts or ruts in the needles or seats. Is that correct?

A. Yes, sir.

Q. 277. Did you ever work on any hydro-electric power plant where repairs are not necessary from time to time upon the water-gates and valves and so forth?

A. No, sir.

Q. 278. And that is true, particularly, is it not, where there is a considerable amount of gravel in the water?

A. Yes, sir.

Q. 279. And the needles or valves of this Division Creek No. 2 plant never fail to work unless something gets into position to actually jam them. Is that not correct?

A. Yes, sir.

Q. 280. Now, about how long is the pipe-line or pen-stock leading to Division Creek No. 2 power-house?

A. 11,000 feet, I think.

Q. 281. Have you ever been at the in-take end of it?

Mr. Westall: Objected to as not proper cross-examination.

A. Yes, sir.

Q. 282. By Mr. Blakeslee: Does the water enter the pipe-line intake from the open creek? Is there a grizzly or screen at the opening of that pipe-line?

A. Grates.

Q. 283. How far apart are the bars of the grats, approximately?

A. An inch.

Q. 284. And there is a great deal of gravel in this creek, is there?

A. Yes, sir.

Q. 285. That is, Division Creek?

A. Yes, sir.

Q. 286. And there is a steep incline in the bed of this creek leading down to the intake of the pipe-line, isn't there?

A. Yes, sir. The pipe-line is not laying on the bed of the creek, you understand. It is on a concrete bench.

Q. 287. But I asked you as to the bed of the creek down where the water flows into the pipe-line. That is a steep bed?

A. Yes, sir.

Q. 288. And very gravelly?

A. Yes, sir.

Q. 289. But it requires considerable long service of these valves or needles and their seats in order for this gravel-cutting to take place, does it not, and when such needles or the heads thereof or the seats become so cut and worn as to leak more than you want to have them leak, it is a simple matter to put in new needles and seats, is it not?

A. Yes, sir.

Q. Can you think of yourself as being so foolyish as to throw out this by-pass or auxiliary valve nozzle at this Division Creek No. 2 plant just because the needles or seats become ruttled?

A. No, sir; I would not throw them out.

Q. 291. You would simply make the common sense replacement, wouldn't you?

A. Yes, sir.

Q. 292. Now, in the operation of this Division Creek No. 2 plant you have no particular object in saving water, have you?

A. No, sir.

Q. 293. The water does not come from a reservoir, does it?

A. No, sir.

Q. 294. And it is not used in that neighborhood for irrigation?

A. Yes, sir.

Q. 295. That is, it is used below you?

A. Yes, sir.

Q. 296. Is it used above you?

A. No, sir.

Q. 297. So that it does not make much difference as to that plant or to the city how much water is passing the wheel, as long as it can be used at any time to operate the wheel. Is that correct?

A. I don't know how that is. I don't know how the city feels about that.

Q. 298. I mean there is no provision for saving and storing any water above the power-house, is there?

A. No, sir.

Q. 299. Then if this by-pass valve or relief valve were maintained in operation half-way open it would not make any difference, as far as water saving is concerned, would it?

A. Not that I know of. The water goes back into the creek.

Q. 300. And the water has got to flow if you take it into the pipe-line?

A. Yes, sir.

Q. 301. And there is no storage for the water above the pipe-line?

A. No, sir; only the dam which is naturally constructed across the creek to hold the water.

Q. 302. To create a forebay for the pipe-line?

A. Yes, sir.

Q. 303. And that forebay has no great holding or impounding capacity?

A. No, sir.

Q. 304. Then I take it that the auxiliary or by-pass needle valve which was in the Division Creek No. 2 plant when you first became acquainted with it, four years ago, is still in place and operating in that plant. Is that not correct?

A. Yes, sir.

Q. 305. And there has never been any substitution made of it?

A. No, sir; not to my knowledge.

Q. 306. And your connection with that plant has been continuous for those four years?

A. Well, it has not been continuous. I was away from March to August.

Q. 307. Of what year?

A. 1913. Last year.

Q. 308. But, so far as you know, no change was made in this auxiliary needle during that time or any time?

A. No, sir.

Q. 309. How long was the auxiliary or by-pass valve seat, being Defendant's Exhibit Division Creek No. 2 Needle Seat, used at that plant?

A. Two years or maybe longer or maybe less. It is in the neighborhood of that.

Q. 310. Then as I understand it the two seats and the needle which you have referred to and which were offered in evidence in connection with your direct examination were all used at this Division Creek No. 2 plant on the aqueduct of the city of Los Angeles, California, in Inyo county, California, while power was generated at that plant for the use of the said city of Los Angeles in the construction of the Los Angeles aqueduct and while you were connected with that plant. Is that correct?

A. Yes, sir.

Q. 311. Now, you have spoken of adjusting the auxiliary or by-pass valve or needle. Did you ever adjust it in any way?

A. No, sir.

Q. 312. But it is your understanding that it can be adjusted to set it at a desired position that you want?

A. Yes, sir.

Q. 313. In other words, you can set it so that normally or at rest it is closer to or further away from its seat. Is that correct?

A. Yes sir; I think that can be done. I will say yes.

Mr. Westall: You mean the auxiliary nozzle can be set so that it will not be entirely closed. Is that your question?

Mr. Blakeslee: The question speaks for itself. Do you understand the question?

A. Yes.

Q. 314. Then am I to understand that you do not understand just how this can be done because you are not familiar with the operation of the dash-pot connected with this by-pass needle or valve and as shown in Complainant's Exhibit V? Is that correct?

A. Yes; I could not adjust it.

Q. 315. This would require the attention of somebody else—some engineer or somebody else—connected with the aqueduct service?

A. I don't know as it would be connected with the aqueduct service, but it would be some one that understood what they were doing. If they done it at all they should know what they were doing.

Q. 316. Who is it that attends to such things as this at that plant when they need doing? Mr. Scattergood?

A. I never had anybody do it only one foreman—one man in charge. He would be the man to look after it. Three or four of us fellows working on them never took any interest in it.

Q. 317. He was the man that did it?

A. Yes sir; supposed to be.

Q. 318. Who is he?

A. There have been several foremen up there.

Q. 319. Who is it at present?

A. I am the only one there.

Q. 320. You say that you would not attempt to adjust this by-pass valve yourself. Now, if it were to be adjusted at the present time whom would you call upon?

A. Search me. I would have to notify somebody.

Q. 321. Whom would you notify, assuming that you wanted to adjust it today?

A. I would ask Mr. Van Norman about it.

Q. 322. The same one that you referred to before?

A. Yes sir.

Q. 323. How long has the by-pass valve at that plant been leaking?

A. I can't give you a date on that.

Q. 324. Can you say approximately?

A. Yes; four or five months.

Q. 325. And the leakage does not interfere sufficiently with the action of the by-pass, in your opinion, to need correction, as yet?

A. No sir.

Q. 326. It does not do any damage to any part of the governor in its action or any part of the plant, does it?

A. No sir; not that I know of.

Mr. Blakeslee: That is all.

May 26, 1914, P. M.

REDIRECT EXAMINATION.

By Mr. Westall:

Q. 327. In addition to gravel or sand which washes into the pipe and causes leakage of the main nozzle and the auxiliary nozzle, is there anything else that ever causes those valves to leak?

A. Yes sir; there is obstructions such as sticks

and pine bark and pine cones or something like that that comes down and gets in there.

Q. 328. Does that get through the ^Tgates that you have spoken of?

A. Yes sir.

Q. 329. And what effect does it have when it gets into the nozzles?

A. It really does not have the effect on the operation until the time of shutting down, and in closing the main needle if it happens to be in front of that it is absolutely impossible to close it, and if it happens to be further open and be in the auxiliary, it is bad there too. It can't close.

Q. 330. If I have understood your testimony on cross-examination, either you or Mr. Blakeslee has suggested that there might be some means for adjusting the parts connected with the auxiliary needle so that needle would not completely close as its normal position?

Mr. Blakeslee: Objected to in so far as it is not in accordance with the previous testimony which was that such adjustments took place, the witness saying he did not understand how.

Q. 331. By Mr. Westall: Have you any definite knowledge of any kind as to the existence of such adjusting means?

Mr. Blakeslee: The same objection.

A. I couldn't answer that because I don't know how I would go about it to do it.

Q. 332. By Mr. Westall: Do you know of any such adjusting means? In other words, I will put it

this way: Do you know of any way in which that can be adjusted so as to make the normal position of this valve part way open?

Mr. Blakeslee: It is to be noted that the witness testified that he does not understand the means or the use of the means by which any such adjustment occurs, having testified as to adjustments but not the *modus operandi*.

Mr. Westall: The question is does he know of any such means or any manner in which an adjustment of that kind could be made.

Mr. Blakeslee: The witness has testified that he does not know how it would be done.

A. I don't know how it would be done, because I have never had the auxiliary apart to know how it could be.

Q. 333. By Mr. Westall: Do you know that it could be done?

A. No sir; I do not.

Q. 334. To your knowledge has any such adjustment ever been made or attempted at the Division Creek No. 2 plant about which you have testified?

A. No sir.

Q. 335. Has any one connected with the plant ever suggested to you the possibility or desirability of making any such adjustment?

A. No sir; there has never been any occasion for it that I know of.

Q. 336. So that if any adjustment is possible or if any such adjustment could be used for any use-

ful purpose, if I understand your testimony, you don't know of any such purpose?

A. No sir.

Q. 337. The normal position of the auxiliary valve being closed, as you have testified, except when necessary to protect the pipe-line from excessive pressures, state whether or not there would be any reason for adjusting the valve of the by-pass so that it would be part way open.

Mr. Blakeslee: Objected to as calling merely for a conclusion and expression of opinion on the part of the witness, and not for facts.

A. No sir; not that I know of, because—give me the question again, please. (The question is read.)
No sir.

Q. 338. By Mr. Westall: Now, as I understand it, you changed these needle seats and the needle on the main nozzle to prevent this leakage?

A. Yes sir.

Q. 339. And you did this, if I understand you correctly, because you found such leakage was undesirable?

A. Yes sir. I think I gave that once before.

Q. 340. Now, during the normal operation or usual ordinary operation of the plant, with an ordinary load, and the governor in, how often does the auxiliary valve open as compared with the opening and closing of the main needle of the main nozzle?

Mr. Blakeslee: Objected to as calling for an arbitrary statement of relations or relative values or arithmetical relations, and as having been gone into

previously by the witness thoroughly, and not proper redirect examination.

Q. 341. By Mr. Westall: Perhaps I can make the question a little more clear to obviate the objection. In a general way, merely from your experience, how often does the auxiliary needle operate to open, as compared with the movements of the main needle with an ordinary load on, where there are no extreme fluctuations of pressure?

Mr. Blakeslee: The same objection.

A. Where there is no extreme fluctuation in pressure the auxiliary does not work at all. It is always closed.

Q. 342. By Mr. Westall: So that if I understand you correctly, it is only where there are extreme fluctuations in pressure that that auxiliary valve ever opens?

Mr. Blakeslee: Objected to as leading.

A. Yes sir.

Q. 343. By Mr. Westall: And what have you to say as to the movement of the main needle nozzle. How frequently does that move under ordinary load conditions?

A. It is forever moving all the time.

Mr. Westall: I believe that it all.

RECROSS-EXAMINATION

By Mr. Blakeslee:

Q. You do not know, do you, Mr. McAfee, but what the auxiliary valve as a matter of fact is also moved somewhat through the dashpot connected

with it when the main valve moves at Division Creek No. 2 plant?

A. Well, I cannot give a definite answer on that, as I said before. It might move and it might not move, but my idea of it is on a light load it does not move.

Q. 345. But you don't know definitely that it does not?

A. No sir.

Q. 346. And when any material fluctuations in load take place, that is, when fluctuations over those that you might call slight occur, the auxiliary valve does move, to your knowledge, with the main valve, does it not?

A. Yes sir.

Q. 347. Now, the leakage which you have testified about and which led to your taking out the main needle valve and its seat and the auxiliary seat in this plant, did not interfere with the action of the governor in controlling the wheel, did it?

A. No sir.

Q. 348. If you shut off the water on the wheel at that plant at the main gate the obstructions such as could come through the grizzly or grates at the intake of the penstock with a mesh, we will say, of an inch, would not interfere with shutting down the wheel entirely?

A. If I closed the big valve?

Q. 349. Yes.

A. You mean the gate valve?

Q. 350. Yes. The hand operated gate.